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AUTHOR	Puma, Michael J.; Karweit, Nancy; Price, Cristofer; Ricciuti, Anne; Thompson, William; Vaden-Kiernan, Michael
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ABSTRACT

This report is one of a series presenting findings from "Prospects: The Congressionally Mandated Study of Educational Growth and Opportunity." This study, conducted in response to the 1988 Hawkins-Stafford Amendments, was a major effort to examine the effects of Chapter 1 on student achievement and other school-related educational outcomes. Data were collected during school years 1991-1994 from nationally representative samples of students from grades 1, 3, and 7 in an initial sample of about 400 schools. An essential finding of an interim report was that Chapter 1, as it was configured in 1991 and 1992, was insufficient to close the gap in academic achievement between Chapter 1 students and their more advantaged peers. In the period covered by this study, the achievement gap remained a reality. There were some highly disadvantaged schools in which children performed better than students in other high-poverty schools, and these were characterized by school-wide Chapter 1 programs; greater use of tracking by ability; more experienced principals; lower rates of student and teacher mobility; a balanced emphasis on remediation and higher-order thinking in classroom instruction; and higher levels of community, parent, and teacher support for the school's mission. Chapter 1 did serve the students most in need of help, but its assistance was insufficient to close the achievement gap. This is not to say that Chapter 1 was not helpful, but it was not enough to bring its students up to par. Data from the Prospects study support earlier research findings that the characteristics of the individual student and family account for the largest part of the variation in student achievement as measured by test scores, but that schools do make an important contribution that can be enhanced. Three appendixes present characteristics of low and high poverty schools, characteristics of high-performing high-poverty schools, and a description of the Technical and Stakeholder Work Group for the study. (Contains 13 exhibits and 9 references.) (SLD)

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Abt Associates Inc.

55 Wheeler Street
Cambridge, Massachusetts
02138-1168

617 492-7100 *telephone*
617 492-5219 *facsimile*

Hampden Square, Suite 500
4800 Montgomery Lane
Bethesda, Maryland
20814-5341

301 913-0500 *telephone*
301 652-3618 *facsimile*

101 North Wacker Drive
Suite 400
Chicago, Illinois
60606-7301

312 332-3300 *telephone*
312 621-3840 *facsimile*

Prospects: Final Report on Student Outcomes

April, 1997

Prepared for
Planning and Evaluation Service
U. S. Department of Education

Prepared by
Michael J. Puma
Nancy Karweit
Cristofer Price
Anne Ricciuti
William Thompson
Michael Vaden-Kiernan

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Members of the *Prospects* Technical and Stakeholder Work Groups (listed in Appendix A) were actively involved in defining the research objectives and methods, and contributed enormously to our understanding of the complexity of the educational context within which the Chapter 1 program plays a critical part.

A large number of Abt Associates and sub-contractor staff also contributed to the study. Calvin Jones was the Abt Project Director from 1991-1994, Harrison Greene served as Deputy Project Director from 1991-1993 and then as Acting Project Director from 1993-1994. John Loft has directed the project since 1994. Linda LeBlanc was the Westat Project Director; Morris Hanson, Ed Bryant and Adam Chu developed the sample design and selection procedures; Chris Kass, Dward Moore, Janet Friedman, Reina Sprankle, and Greg Binzer completed data collection and processing for half of the *Prospects* sample. Donald Rock and Judy Pollack of the Educational Testing Service contributed to both psychometric and policy analyses. Robert Slavin, Sam Stringfield, Jim McPartland, and Linda Winfield of The Johns Hopkins University assisted with the overall study and instrument design, and plans for baseline data analyses.

Most of all, we would like to thank over 40,000 students and their families, as well as the many hundreds of school administrators and thousands of teachers in all parts of the country for their participation in the *Prospects* study. We will strive to ensure that their selfless contribution results in a powerful resource for the improvement of educational opportunity and growth for all Americans.

While expressing our gratitude to the many who have supported the early efforts of the *Prospects* study, the authors retain full responsibility for all interpretations of the material presented here.

Executive Summary

The Chapter 1 Program

For more than 30 years, the federal government has provided financial assistance to schools to compensate for the effects of poverty on the educational progress of disadvantaged children. Chapter 1 (or Title I), the flagship program targeted at this objective, with funding of about $7 billion, reaches over six million children each year, covering about three-quarters of all elementary schools and nearly half of all middle and secondary schools. About 21-23 percent of students in the 1st through 3rd grades participate in Chapter 1, declining to about 18-21 percent for children in the 4th through 6th grades, and to 5-8 percent for students in the 7th through 9th grades. During the early 1990s most children received targeted assistance with only a relatively small percentage of students attending a schoolwide program (a program option allowing all students in an eligible school to receive assistance).

Despite its ambitious mandate, the program has been a relatively marginal educational intervention. Until the recent legislative changes passed in 1994, funds were spread thinly among a large number of eligible schools. In addition, services tended to be targeted toward the early primary grades, and most participating children received assistance in reading/language arts alone; relatively few students received additional instruction in math. Typically, Chapter 1 operated as an "add on" to regular classroom instruction and added only an average of 10 minutes of extra instructional time per day. Typically, Chapter 1 students were pulled out of their regular classroom for supplementary instruction during the school day. This method of service delivery has been criticized for stigmatizing students, disrupting regular classroom instruction, and reducing the time students spend with their regular classroom teacher and classmates.

The level of instructional assistance Chapter 1 students generally received was in stark contrast to their level of educational need. On average, these children were poor, non-white, had undereducated parents, had parents for whom English was not their native language, and often lived in urban areas with the associated increased likelihood of exposure to violence and an array of modern social ills. Also, as expected, these children had substantial educational deficits -- they scored well below their more advantaged peers on standardized tests, received low grades, and were rated lower by their teachers on a variety of important dimensions including attention, cooperativeness, effort and motivation, and participation in class.

The *Prospects* Study

This report is one of a series to present findings from *Prospects: The Congressionally Mandated Study of Educational Growth and Opportunity*. This study, conducted in response to the 1988 Hawkins-Stafford Amendments, was a major effort to examine the effects of Chapter 1 on student achievement and other school-related educational outcomes. Data for the study were collected during school years 1991-1994 from nationally representative samples of students selected from three cohorts of students enrolled in an initial sample of about 400 schools. Data collection began for 1st-grade students in the fall of 1991, and for 3rd-grade and 7th-grade students in the spring of 1991. Information about these students was collected annually using a variety of sources: standardized tests in reading and math; student surveys for students in the 3rd grade or above; abstraction of data in school records; parent surveys; and questionnaires administered to teachers, principals, and district administrators. Students in the 1st- and 3rd-grade cohorts were followed until spring, 1994; students in the 7th-grade cohort were followed until spring 1993.

The Interim Report

An interim report, *Prospects: The Congressionally Mandated Study of Educational Growth and Opportunity, 1993* described participation in the baseline year 1991 and documented a number of important changes in student performance that occurred between 1991 and 1992:

- The learning gap between high- and low-poverty schools was large, and appeared to increase as children progressed through school.
- Chapter 1 participants were highly disadvantaged students on both academic and behavioral measures: their initial gap in performance did not change during their participation in compensatory education over the school year.
- Many children who were in need of extra assistance were not being served by the existing compensatory education programs.

The essential finding that Chapter 1, as it was configured at that time, was insufficient to close the gap in academic achievement between Chapter 1 students and their more advantaged peers contributed to a significant rethinking of the program. In 1994, this helped lead to important legislative changes to federal education support that included the following goals:

- Ensure that children served by the program are expected to achieve the same high standards that the states apply to all their students.
- Support challenging curriculum and accelerated instruction to provide students with the opportunity to meet challenging state standards.
- Expand schoolwide programs to more high-poverty schools to improve the curriculum and instruction of entire schools.
- Help support high-quality teacher training to prepare teachers to provide challenging curriculum and instruction.

- Promote partnerships between parents and schools.
- Hold schools and districts accountable for showing progress in raising the performance of students served by the program.
- Target money to the neediest schools.

Prospects data collection was ended at the time of the 1994 legislative changes to Chapter 1 (which included renaming the program to its original name of Title I). This report presents results covering the entire study period from 1991-1994.

Conclusions

School Poverty Concentration Is Associated With Lower Academic Performance

In the period covered by this study, children in high-poverty schools began school academically behind their peers in low-poverty schools, and were unable to close this gap in achievement as they progressed through school.

When assessed against high academic standards, most students failed to exhibit the skill mastery in reading and mathematics expected for their respective grade levels. Students in high-poverty schools were, by far, the least able to demonstrate the expected levels of academic proficiency.

Academic Standards Vary Between High- and Low-Poverty Schools

A cornerstone of current educational reform initiatives is the desire to hold all students to high academic standards. This objective may, however, pose serious difficulties for students in our most disadvantaged schools as higher standards could increase an already substantial gap between the achievement levels of the children of the poor and the well-to-do. For example, when measured against standardized test scores, a grade of "A" in a high-poverty school is equivalent to a grade of about "C" in a low-poverty school.

There Are Some High-Poverty Schools That Show Better Student Performance

There were at least a small number of highly disadvantaged schools in which students performed better than students in other high-poverty schools. These high-performing high-poverty schools were characterized by: a schoolwide Chapter 1 program, greater use of tracking by student ability, more experienced principals, lower rates of teacher and student mobility, a balanced emphasis on remedial and higher-order thinking in classroom instruction, and higher levels of community, parent, and teacher support for the school's mission. Although we cannot make reliable attributions of the characteristics of these schools to their ability to produce seemingly higher levels of student performance, the data are suggestive and provide a direction for future research.

Chapter 1 Services Did Not Close The Gap In Student Academic Achievement

Chapter 1 did, on average, serve those students who were clearly most in need of supplementary assistance. However, Chapter 1 assistance was, on average, insufficient to close the gap in academic achievement between advantaged and disadvantaged students. The observed lockstep pattern of student growth clearly demonstrated that where students started out relative to their classmates is where they ended up in later grades.

Our inability to discern a compensatory effect of Chapter 1 is not necessarily an indication of program failure. Limitations of the *Prospects* study prevented us from observing directly whether Chapter 1 students would have been worse off (i.e., whether the gap would have widened over time) in the absence of the services they received. In fact, we might expect the gaps to grow over time, absent a special intervention. Chapter 1 may have helped but was too weak an intervention to bring the participating students up to par with their classmates.

Factors Associated With Higher Student Performance In School

Data from *Prospects* confirm the earlier findings by Coleman et al. (1966) that the characteristics of an individual student and his/her family account for the largest part of the overall variation in student achievement as measured by test scores. However, although relatively smaller, school factors do make an important contribution to student academic achievement and growth. Furthermore, all schools have students that exhibit a range of academic achievement levels; poor schools are not filled solely with low-achieving students, nor are low-poverty schools filled solely with high-achieving students. There are good students in most schools, even in the most troubled places, and even the best schools have students for whom academic work is a challenge.

The statistical models used to assess the effect of Chapter 1 participation also provide evidence of factors that are important correlates of student achievement:

- ***Student and Family Characteristics:*** preschool education was associated with higher achievement; minorities and non-native English speakers exhibited lower achievement; girls had an early grade advantage in reading skills, but generally did less well in math throughout the grade span covered by this study; and students from poor families, and those who experienced frequent moves, performed less well academically.

- ***Parents:*** Parental expectations for their children's' success in school and parents' involvement in school activities, were associated with higher student achievement. Surprisingly, we found that parents who were more actively involved with their children's school work were associated with ***lower*** student achievement. But this is likely related to the greater need for attention and supervision of low-achieving students.

- ***Teachers and Schools:*** Higher levels of school poverty concentration were associated with lower student academic achievement, as were grade retention and higher levels of student disciplinary actions at the school (i.e., increased disruption). Teachers who placed a greater emphasis on comprehension and higher-order thinking skills were associated with higher student academic achievement.

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CHAPTER ONE

INTRODUCTION

For more than 30 years, since the passage of Title I of the Elementary and Secondary Education Act (SEA) in 1965, the federal government has provided financial assistance to improve education for elementary and secondary school children who are identified to be at risk of school failure, and who live in low-income communities. The original goals of Title I (later called Chapter 1 before regaining its original title in 1994),[1] were deeply embedded in the 1960's social reforms of the Great Society:

- To provide financial assistance to school districts where the concentration of low-income families reduced their ability to provide adequate educational programs; and,
- To meet the special educational needs of disadvantaged children.

Since its inception, the program has been the cornerstone of federal support to education, and its annual appropriation of about $7 billion dominates the federal elementary and secondary education budget. The breadth of the program's influence in public education should not be underestimated. It reached over six million children annually, primarily in the early elementary grades (one in every five 1st-graders participated in Chapter 1), three-quarters of all elementary schools, about half of middle and junior high schools, and one-quarter of high schools (Millsap, et al., 1992).

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[1] Because this study was conducted during the period when the program was referred to as Chapter 1, we will use this notation throughout this report.

The *Prospects* Study[2]

Congressional Mandate

Congress, in the 1988 Hawkins-Stafford Amendments to the Elementary and Secondary Education Act (Section 1462, Public Law 100-297), mandated a "national longitudinal" assessment of the impact of Chapter 1 based on a comparison of the "...educational achievement of those children with significant participation in Chapter 1 and comparable children who did not receive Chapter 1 services." The 1988 legislation further required that the study "...should be conducted throughout the country in urban, suburban and rural areas and shall be of sufficient size and scope to assess and evaluate the effect of the program in all regions of the country."

Study Design

To meet this mandate, *Prospects* collected a large amount of information from students (standardized tests and self-administered surveys), parents, teachers (both regular classroom and Chapter 1 instructors), principals, district-level staff, and students' school records. The sample was large (initially involving nearly 40,000 students in 365 schools),[3] it covered a broad grade span from 1st to 9th grade, and tracked the *same* students from 1991 to 1994. As shown in Exhibit 1.1, data were collected from three student grade cohorts:

- 1st-grade cohort: students beginning 1st grade in the fall of 1991, who were tracked from entry into school through completion of the 3rd grade in the spring of 1994;

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[2] For a complete description of the *Prospects* study design and implementation see Puma, Michael et al., (1997), *Prospects: The Congressionally Mandated Study of Educational Growth and Opportunity -- Technical Report*. Abt Associates Inc.: Bethesda, MD.

[3] Samples of students who moved from their initial school during this field period were followed and interviewed and tested in their new schools. By the end of the data collection period the total number of schools increased to 1,760.

- 3rd-grade cohort: students enrolled in the 3rd grade in the 1990-91 school year, who were tracked from the end of their 3rd grade year (spring 1991) through completion of the 6th grade in the spring of 1994; and

- 7th-grade cohort: students in the 7th grade during the 1990-91 school year, who were tracked from the end of 7th grade (spring 1991) through the completion of the 9th grade in the spring of 1993.

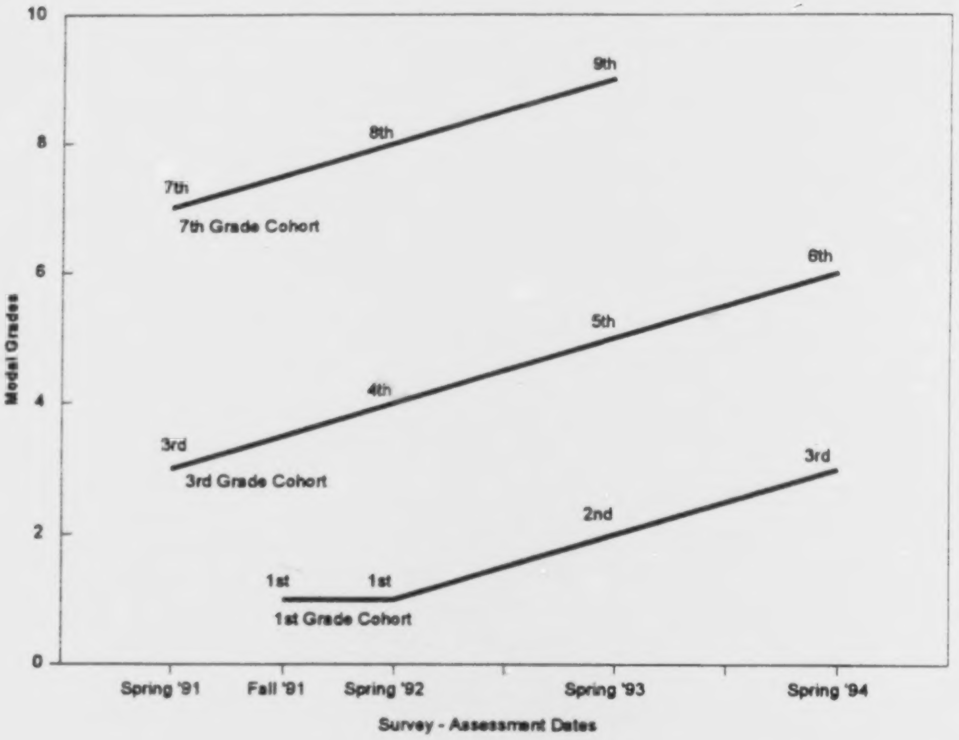
No other currently available information allows analysis of the rich relationships among student characteristics and childhood experiences, family environment, and school and classroom characteristics and instructional processes. Data collected included the following:

- Student data were collected from several sources. The ***student abstract*** collected information from school records: absenteeism, tardiness, and grade retention; educational experiences such as preschool and Head Start attendance; identified disabilities; and participation in Chapter 1 or other remedial or special education programs. The ***student profile,*** completed by the teacher who was most knowledgeable about the student (usually the regular classroom teacher), included teacher ratings of the student on topics such as ability, motivation, attitudes, classroom socialization, language skills, and health status. Finally, a ***student questionnaire***, administered to students in the 3rd grade and above, collected data on current and past educational experiences, student and family demographics, educational aspirations, perceived academic strengths, grades, school attendance, participation in extracurricular activities within school and outside of school, and parent participation in their schooling.

- The ***parent questionnaire*** provided information on parent and family characteristics, and additional information about parental attitudes and practices related to student learning. Topics included parental demographic information, household composition, income and employment, and home environment characteristics such as family rules, educational activities in the home, and parents' expectations for their child.

- ***Academic achievement*** was assessed using the Comprehensive Test of Basic Skills 4th edition, a vertically equated test series designed to measure achievement in the basic skills taught in schools throughout the nation. The CTBS/4 was used to measure student achievement status and gains in reading/language arts and mathematics.

Exhibit 1.1: ***Prospects*** **Data Collection Points by Study Cohort**



- The ***teacher instruments*** included information about teacher background, certification and experience, school climate (e.g., parent contacts, interactions with administration, and degree of influence over policies), and classroom instructional practices. Regular classroom teachers and Chapter 1 teachers were asked about the characteristics of their respective programs (teaching load, grade assignments, frequency of instruction, use of aides, instructional techniques), their responsibilities (subjects taught and extracurricular activities), their access to resources (including use of computer-assisted teaching programs), and their assessment of the performance level of their students. Teachers were also questioned about the coordination of the Chapter 1 program with regular teaching, and the selection process for admitting students to Chapter 1 instruction.

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- The ***principal questionnaire*** and the ***characteristics of schools and programs*** *(CSP)* were both administered to the school principal or his/her designate. The principal questionnaire covered the following topics: the principal's background and experience, school policies, administrative techniques, and Chapter 1 program features (e.g., goals of the program, selection procedures, and parental involvement). The CSP questionnaire focused on the organization of the school (enrollment, grades taught, size of staff, class organization), demographics of the student body, and type and organization of Chapter 1 programs (and other special education programs) at each grade level.

- Finally, district information was obtained from the ***Chapter 1 district coordinator.*** Topics covered on this questionnaire included: district staff size, enrollment at each grade level, daily attendance, length of the school day, provision of in-service training for personnel, and demographics for the district (racial composition and poverty level). The district coordinator was asked about the characteristics of the Chapter 1 program, including the selection process for schools and students, instructional approaches in each subject area, staff size, method of evaluating the program, and activities for parental involvement. The district coordinator was also asked about characteristics of non-Chapter 1 compensatory education programs and services for language minority and Limited English Proficient (LEP) students.

Chapter 1 As It Operated in the Early 1990s

Throughout its history, Chapter 1 has been essentially a funding source. Beyond some broad guidelines, local school districts and schools had enormous flexibility to decide where and how to focus the resources they received. That is, they could decide which schools and grades received funds, how much they received of the types of services that were provided, the content areas that were targeted, how teaching was done, and by whom. Consequently, the program could mean very different things in different schools. Furthermore, even for those students who received assistance, federal funding was equal to only about 15 percent of total average expenditures per pupil (Riddle, 1996). This small proportion of federal assistance is due to a variety of factors, including, 1) the limited level of funding in relation to the size of the eligible population, 2) allocation formulas that spread the funds thinly across a large number of school districts, and 3) an inadequate targeting of funds to the high-poverty schools where the level of need was greatest.

School and Student Selection

The U.S. Department of Education distributed Chapter 1 funds directly to counties based on the number of poor children aged 5-17 identified in the decennial census, with an adjustment using a state average per-pupil expenditure factor intended to recognize cost of living differences across states. States then suballocated the funds to school districts in proportion to the number of children from low-income families in each district. Within the school district, a school was eligible for Chapter 1 assistance if its attendance area had a poverty rate that was relatively high for that district. In general, districts selected the schools that ranked highest in poverty, but the law allowed districts several alternatives to a strict ranking. Finally, within selected schools, individual students were selected for services on the basis of their educational need, rather than on the basis of their parents' financial status. According to *Prospects,* almost all students attended schools that used standardized testing to select students for Chapter 1 services.

Staffing and Spending Patterns

Districts reported that between 70 and 80 percent of Chapter 1 dollars were used to pay salaries for instructional, administrative, and support staff. However, staffing arrangements for Chapter 1 instruction differed for low- and high-poverty schools.[4] Although classrooms in low- and high-poverty schools had roughly the same number of staff per child, the high-poverty schools were more likely to use the funding to staff the classroom with additional instructional aides; in contrast, low-poverty schools tended to use certified teachers. The aides also assumed different responsibilities in low- and high-poverty schools. Aides in low-poverty schools were more likely to have responsibility only for non-instructional tasks while aides in high-poverty schools had responsibilities for instructional as well as non-instructional tasks. As a consequence, the extra resources provided to high-poverty schools by Chapter 1 may not have necessarily improved the quality of classroom instruction on a par with the more advantaged schools.

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[4] Throughout this report, school poverty is measured using the percentage of enrolled students who were eligible for free and reduced-price school meals. High-poverty schools are those in which 75 percent or more of the students are eligible; low-poverty schools are those in which 25 percent or fewer of the students are eligible.

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Arrangement of Chapter 1 Services

The *Prospects* data match earlier research findings that show a declining reliance on pull-out as the only setting for Chapter 1 services (i.e., where students are removed from their regular classroom during the school day for supplemental instruction). But this method of instruction still remained the dominant mode of service delivery, especially in the low-to moderate-poverty schools. For example, about three-quarters of all 3rd-grade Chapter 1 students received services by being pulled out of their regular classrooms. This mode of service delivery has been often criticized for disrupting the regular classroom, for stigmatizing students who are pulled out, and for providing instruction of uneven quality.

Subject Matter and Services

Most students who participated in Chapter 1 received assistance in reading/language arts. Only some students received math instruction, and relatively few Chapter 1 participants received services in non-instructional areas such as counseling or health education (about 3 percent). For example, of the students participating in Chapter 1, 96 percent of 1st-graders, 83 percent of 4th-graders, and 81 percent of 8th-graders received assistance in reading. In contrast, about 30 percent of 1st-graders received services in both reading and math; the corresponding figures for the 4th and 8th grades are 37 and 22 percent, respectively. However, a greater percentage of students in high-poverty schools received assistance in *both* reading and math than did participants in low-poverty schools.

In elementary grades, Chapter 1 math teachers and regular classroom teachers typically used the *same* instructional materials at the *same* grade level. However, Chapter 1 reading teachers more often reported the use of *different* materials at the *same* instructional level. It was also found that the availability and use of computers by teachers in classrooms varied greatly by grade, with middle school students having the lowest access to teachers who used computers.

Finally, the dominant practice in Chapter 1 math was whole class instruction; in Chapter 1 reading, within-class grouping was used slightly more often than whole class instruction.

Instructional Time

The majority of Chapter 1 students received supplemental services five days per week for an average of 30 minutes per day. With regard to the rest of students' time in school, *Prospects* data indicate the following:

- High-poverty schools allocated more time to Chapter 1 instruction than low-poverty schools.
- Overall, substantially more time was allocated to reading than to math instruction for students in the 1st and 4th grades; by the 8th grade about the same amount of time was allocated to both subject areas.
- High-poverty schools allocated more time for reading and math instruction than low-poverty schools in the 1st and 4th grades. However, by the 8th grade, students in high-poverty schools received ***less*** instructional time in reading and math than students in low-poverty schools.
- Students in high-poverty schools were more likely to have opportunities that increase learning time outside of school (e.g., before/after school programs and summer school) than students in low-poverty schools.
- Students taught using in-class arrangements received about five minutes more per day of academic instruction than students in pull-out programs.

Curriculum and Instruction in Regular Classrooms

Chapter 1 compensatory services comprise only a fraction of a student's school day. The purpose of this section, then, is to better understand what happens in the regular classroom, and to compare the curriculum and instruction in low- and high-poverty schools:

- High-poverty schools were more likely than low-poverty schools to rely on a traditional approach to reading instruction. This approach emphasized reading readiness and decoding, the use of multiple instructional groups, and the use of textbooks and basal readers.

- Whole class instruction was the dominant practice in all schools. First-grade reading instruction was the only situation in which appreciable grouping was used.

- When grouping was used, the basis for grouping was most often similar student abilities.

- Students' regular math and reading classes contained an average of about 22 students, with little variation by school poverty. Rarely reported were class sizes approaching levels found to be associated with differences in student learning (see Mosteller, Light and Sachs, 1966)

- Tutoring was most often carried out as peer tutoring, followed by tutoring using a certified teacher. The use of paraprofessionals to tutor was most frequently found in high-poverty schools.

- For both reading and math instruction, teachers of students in high-poverty schools were most likely to report that computers were never used in their regular classrooms. However, most students, even in high-poverty schools, were in classrooms where computers were used at least some of the time.

Coordination of Services

Most educators believe coordination of services between Chapter 1 and the regular classroom instruction is critically important if students are to gain the most from their school day. The most frequently reported means of communication for this purpose was formal discussion between the two teachers. Further, Chapter 1 and regular classroom teachers agreed that the primary responsibility for the student's instruction and progress rested with the regular classroom teacher.

Characteristics of Chapter 1 Participants

It is important to understand the characteristics of the participating students to appreciate the challenge inherent in the Chapter 1 goal of "closing the gap" in academic achievement between them and their more advantaged classmates. While a more complete picture is available elsewhere,[5] the key findings from *Prospects* are the following:

- Compared to their nonparticipating classmates, Chapter 1 participants were more economically disadvantaged. They were more likely to be living with a single parent, have a total family income under $10,000, receive public assistance, and have poorly educated parents whose nature language is not English. They were also more likely to be non-white and live in urban areas with the concomitant increased likelihood of being exposed to high rates of crime, physical violence, drug abuse, and substandard living conditions.

- Not surprisingly, Chapter 1 participants were also educationally disadvantaged. They scored poorly on reading and math achievement tests, received low grades, were more likely to be retained in grade, and received low ratings of their ability from their classroom teachers. Chapter 1 students also did less reading outside of school, and were less inclined to use the public library.

- The teachers of Chapter 1 children were also more likely to identify a variety of problems that made these students more at risk for school failure compared to their classmates. Chapter 1 students were reported to exhibit lower effort in school, be less motivated, be less likely to follow rules and directions, exhibit less creativity and independence, be less mature, and be less likely to complete school work and to participate in class. The Chapter 1 students themselves were also more likely to report that they had negative experiences at school, including disciplinary action and having their parents called to school.

- Rates of Chapter 1 participation (targeted and/or schoolwide assistance) were generally constant over the grade span of each of the three study cohorts (see discussion below) but declined across cohorts. About 21-23 percent of lst-grade cohort students, 18-21 percent of 3rd-grade cohort students, and only 5-8 percent of 7th-grade cohort students participated in Chapter 1. In the first half of the

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[5] Puma, Michael et al. (1993) *Prospects: The Congressionally Mandated Study of Educational Growth and Opportunity*, Abt Associates Inc.: Bethesda, MD

1990s, most students received targeted assistance -- schoolwide programs covered only 3-5 percent of lst- and 3rd-grade cohort students, and well under 1 percent of 7th-grade cohort students.

- Among nonparticipating students, only 3-10 percent participated in another form of compensatory education. For many students, particularly those in upper grades, services were simply not available as schools had elected to focus their attention on earlier grades. Services were found to be unavailable for 26-32 percent of 1st- and 3rd-grade cohort students, and 47-58 percent of 7th-grade cohort students.
- Although our data do not cover all years of individual students' schooling, it does appear that most Chapter 1 students received assistance for relatively short periods of time. About half of 1st- and 3rd-grade cohort participants received assistance for 1-2 years, and nearly all 7th-grade cohort participants had periods of participation lasting from 1-2 years. For the most part, program availability was not found to be the reason for students leaving the program or having interrupted periods of Chapter 1 assistance.
- As previously noted, most Chapter 1 students received help in reading/language arts/English alone or in combination with assistance in math. Relatively few received only math instruction.

Past Accomplishments and Shortcomings of Chapter 1

During the two decades prior to 1990, test scores, high school graduation rates, and college attendance rates improved dramatically for students from low-income and minority families. From 1970 to the late-1980s, the learning gap between whites and minorities was cut by over one-third in reading, mathematics, and science as measured by test scores on the National Assessment of Educational Progress (NAEP). While these gains cannot be directly attributed to federal programs alone, a recent RAND report asserts that these initiatives contributed to the educational improvement of disadvantaged and minority students. According to the authors, policies aimed at equal educational opportunity for disadvantaged students and increased public investments in their schools and families "provide the most likely explanation for the gains made by black and Hispanic students over and above those predicted by family effects" (Grissmer et al., 1994, p. 107).

However, more recent data from NAEP, the *Prospects* Interim Report (Puma, et al., 1993), and other evaluations conducted for the National Assessment of the Chapter 1 Program (U.S. Department of Education, 1993) showed that progress in closing the achievement gap had stalled. The National Assessment concluded that the Chapter 1 program, as then structured, was insufficient to help students continue to improve and make up the early gaps in academic achievement. Specifically, the report concluded that:

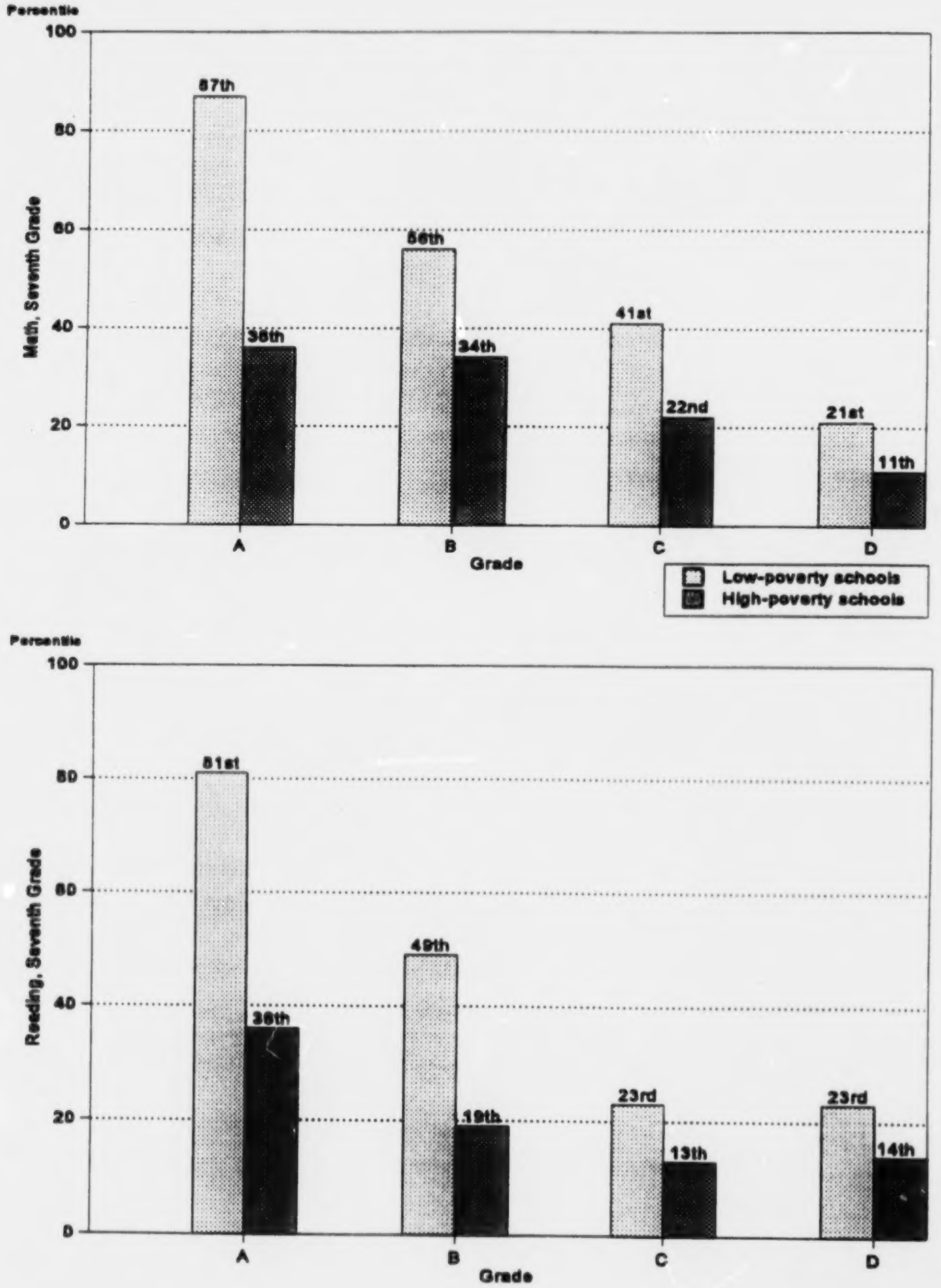
- **The progress of Chapter 1 participants on standardized tests was no better than that of nonparticipants** with similar backgrounds and prior achievement levels.
- **The poverty level of certain schools placed disadvantaged students in double jeopardy.** School poverty depresses the scores of all students in schools where at least half of the students are eligible for subsidized lunch, and seriously depresses the scores when over 75 percent of students live in low-income households.
- **Many Chapter 1 programs reinforced low expectations for student achievement.** Students in high-poverty schools were exposed to a "watered-down" and non-challenging curriculum when compared to other students. Data from *Prospects*, as shown in Exhibit 1.2, indicated that academic standards in high-poverty schools fell far short; performance that rated an "A" in high-poverty schools, was rated about a "C" in low-poverty schools when assessed against standardized test scores.
- **Chapter 1 often operated as an add-on program that worked on the margins,** adding only an average of 10 minutes of extra instructional time per day.
- **When carried out as a separate add-on program, Chapter 1 did not work to improve the regular program of instruction,** where children in Chapter 1 spent almost their whole day.
- **A focus on compliance and regulatory matters, rather than an emphasis on improved student performance**, occupied much of states' and districts' efforts in administering Chapter 1.
- **Chapter 1 dollars were spread to 71 percent of public elementary schools,** including half of all elementary schools serving fewer than 10 percent poor children. Meanwhile, many high-poverty high schools and middle schools

frequently went unserved as districts focused their funds on elementary schools--including those with lower poverty rates.

These results, and corroborating evidence from other research studies, were instrumental in shaping several changes to the program in 1994. These changes included provisions that would:

- **Ensure that children served by the program are expected to achieve the same high standards that the states apply to all their students.** Student assessments that are aligned with academic standards will measure how well Title I students are progressing in meeting challenging standards.
- **Support challenging curriculum and accelerated instruction.** Poor and minority students should have access to the same challenging curriculum as other students. Title I resources are expected to be used to provide participating students with the extra instructional time and services they need to meet new expectations for high achievement.
- **Expand schoolwide programs to more high-poverty schools to improve the curriculum and instruction of entire schools.** The schoolwide option gives schools the flexibility to use Title I and other funds in ways that address the needs of all students.
- **Help support high-quality teaching training.** Expanded efforts are to be implemented to increase the capacity of teachers to provide challenging curriculum and instruction.
- **Promote partnerships between parents and schools.** Additional support to meet the needs of children will come through parent-school compacts, and increased support for family involvement and family literacy programs.
- **Hold schools and districts accountable for showing progress in raising the performance of students served by the program.** After assisting in school improvement, school districts and states are to impose sanctions on schools that have been chronically identified as failing.
- **Target money to the neediest schools,** including middle and high schools.

Exhibit 1.2: Seventh-Graders' Grades and Percentile Test Scores: Low- and High-Poverty Schools, 1991



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This Report

This report is intended to serve as a non-technical description of the *Prospects* findings. Chapter Two describes the differences in student academic achievement between high-and low-poverty schools, and examines the effect of the Chapter 1 program on student educational growth. Chapter Three then compares the characteristics of high- and low-poverty schools, and describes the characteristics of high-performing high-poverty schools, i.e., those where students exhibit better academic achievement when compared to other high-poverty schools. Finally, Chapter Four presents an exploratory examination of the relationship between student, family, and school variables and student educational outcomes.

CHAPTER TWO

DID CHAPTER 1 HELP CLOSE THE GAP?

The primary objective of Chapter 1 is to help disadvantaged students overcome the negative effects of poverty and, in particular, to help close the educational achievement gap between them and their more advantaged classmates. This chapter seeks to answer the question of the extent to which the program was able to achieve this important objective.

Throughout this discussion it is important to keep in mind that the reported results represent the Chapter 1 program as it existed nationally during the period from 1991 to 1994. These are nationally representative findings that describe the typical experiences of Chapter 1 students. These results do not reflect the way the program could operate, or indeed, may operate today as Title I , just the way it was implemented during the period of our study.

Methodological Issues

We begin our examination with a simple descriptive analysis of the academic outcomes used in the *Prospects* study.[1] That is, we examine the year-to-year changes in our selected student outcome measures ***not*** controlling for factors that can affect how these temporal patterns vary among students and/or between schools. As part of this exploration we describe how these growth rates vary among students in low- and high- poverty schools, and among students who do and do not receive Chapter 1 assistance. The second half of this chapter expands this descriptive analysis by using sophisticated statistical models that both control for a variety of important student, family, and school characteristics, and take advantage of the longitudinal and multi-level (i.e., students are clustered within classrooms and schools) nature of the *Prospects* data. The analyses reported here and in subsequent chapters are based on a longitudinal analysis sample constructed from the *Prospects* data. That is, the *same* students were followed across all years of data collection. In addition, sophisticated imputation methods were used to deal with the inevitable problems of missing data.

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[1] A complete description of the *Prospects* data, and the analysis methods used throughout this report, can be found in Puma, Michael, et al., (1997), *Prospects: The Congressionally Mandated Study Of Educational Growth And Opportunity -- Technical Report*, Abt Associates Inc.: Bethesda, MD.

For the purposes of these analyses, three types of student outcome measures were used:

- Standardized scale scores in Reading Vocabulary, Reading Comprehension, Math Concepts and Applications, and Math Computation (all measured by the annually administered CTBS-4 test);
- Teacher ratings of student achievement in reading, language arts/English, and math; and,
- Teacher ratings of student behavior including classroom participation, cooperativeness, and attention (these are multi-item empirically derived scales).

Across these different student outcomes measures, the concept of "growth" cannot be separated from the nature of the test or scale itself. For example, the teacher rating scales are affected both by the contextual setting (i.e., individual student ratings are conditioned by a teacher's experience with other students in the same school) and changing expectations across grade levels. With regard to the first point, teachers in high- and low-poverty schools may use a different basis for judging student achievement. For example, as noted in Chapter One, using the CTBS scores as a common indicator of achievement and class grades as a measure of teacher rating shows that students who received an "A" in a high-poverty school would receive a grade of about "C" in a low-poverty school. Additionally, the teacher ratings are **not** referenced to a common standard of expected performance, particularly the ratings of student behavior where the concept of "growth" is especially difficult. At each grade level, teachers are presumably rating students on the basis of their expected standards of behavior which are likely to change as children mature. That is, the expected level of classroom participation, cooperation, and attention is obviously different for a 7th-grade child compared to a student in the 1st-grade. As a consequence, we focus our discussion in this chapter primarily on student test scores.[2]

Similarly, the CTBS tests have an implicit growth trajectory that reflect an expected rate of learning from year to year. For our purposes we have based our analysis on scale scores that are, according to CTBS, "....units of a single equal-interval scale that is applied across all levels of the CTBS/4 regardless of grade or time of year of testing." This equal-interval and "vertical equating" of the test makes scale scores suitable for statistical purposes, particularly for comparison among classes, schools, districts or other categories of students. For example, a gain of 50 scale score points has the same meaning regardless of where on the scale it occurs, or the difference in grade space over which the growth is observed (i.e., a 50 point gain from the 1st to the 3rd-grade has the same meaning as a 50 point gain from the 3rd to the 5th grade).

Although scale scores can be statistically compared as noted above, some critics have raised concerns about comparing gains across grades for different groups of students because the test means for the national norm samples increase over grades, and the variability (i.e., the standard deviations) is not constant across grades. As a consequence, in the discussion that follows we have elected to describe any observed differences, both in absolute (i.e., the number of scale-score points separating two groups) and relative terms (i.e., differences expressed relative to the standard deviation of the CTBS norming sample).

Relationship of Test Scores to School Poverty

Exhibit 2.1 displays plots of average CTBS scale scores, by reading and math sub-test, for four different groups:

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[2] The accompanying Technical Report provides results on all the student outcome measures.

Exhibit 2.1 Mean CTBS Scale Scores, by School Poverty Concentration and Grade (Weighted Means)

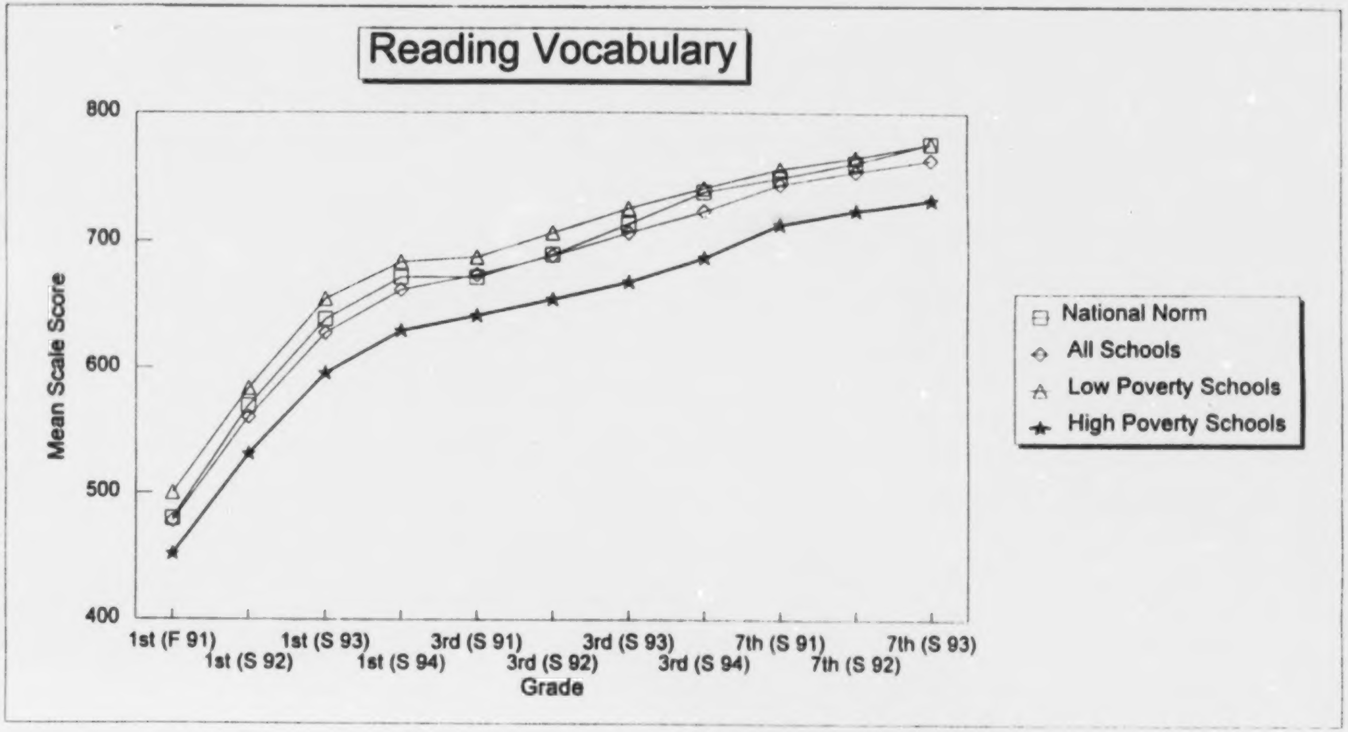

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Exhibit 2.1: (continued)

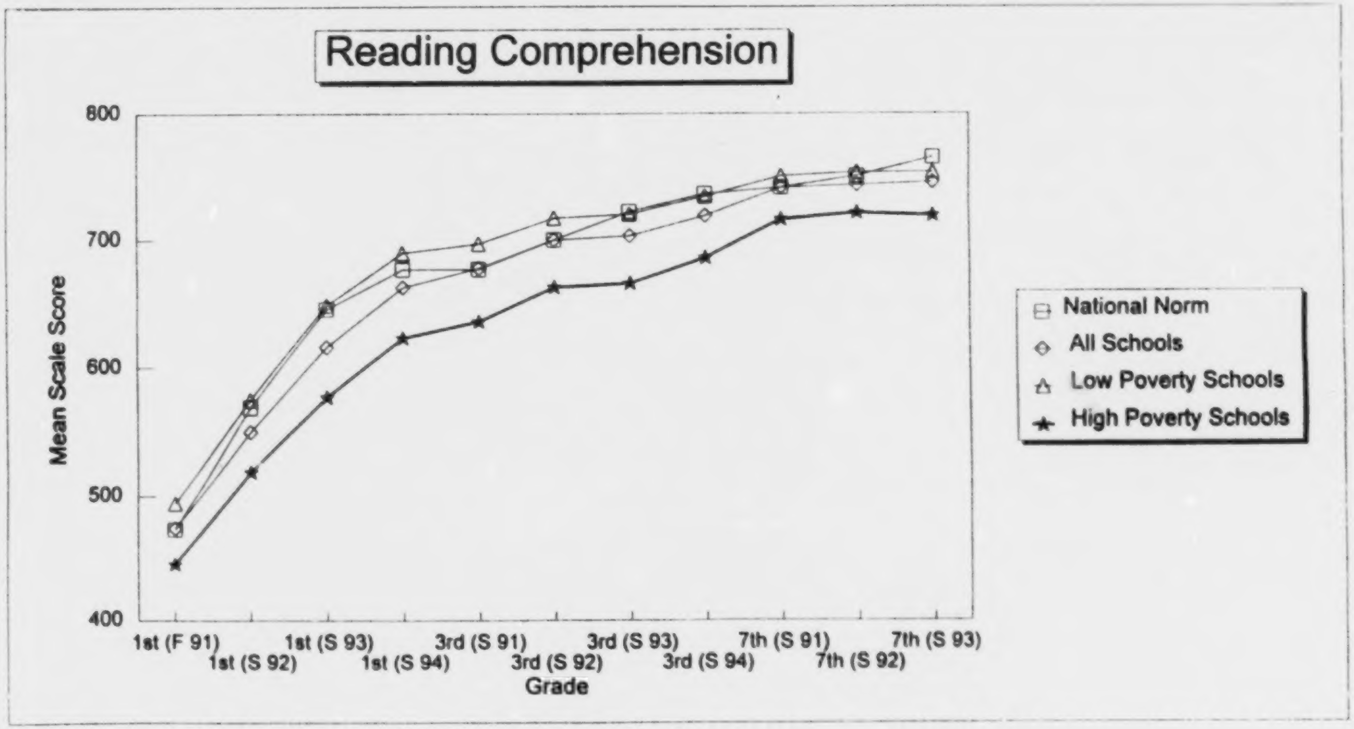

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Exhibit 2.1: (continued)

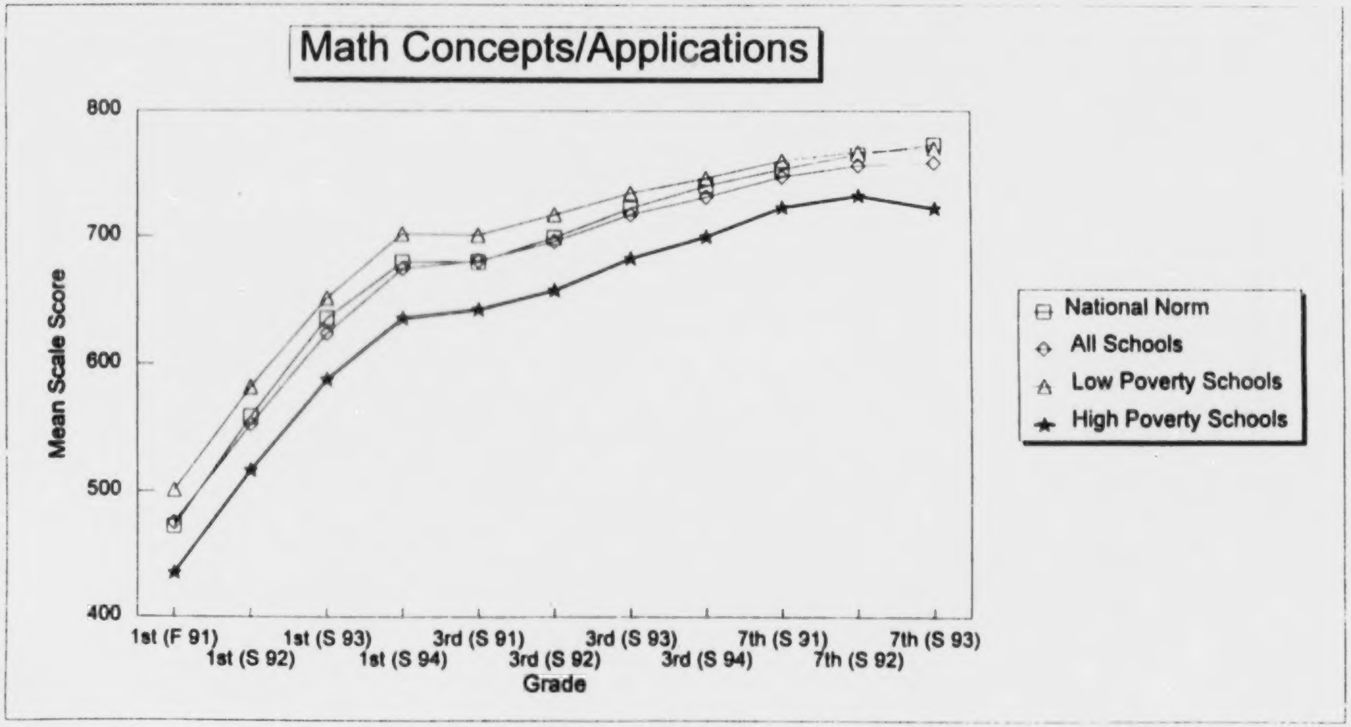

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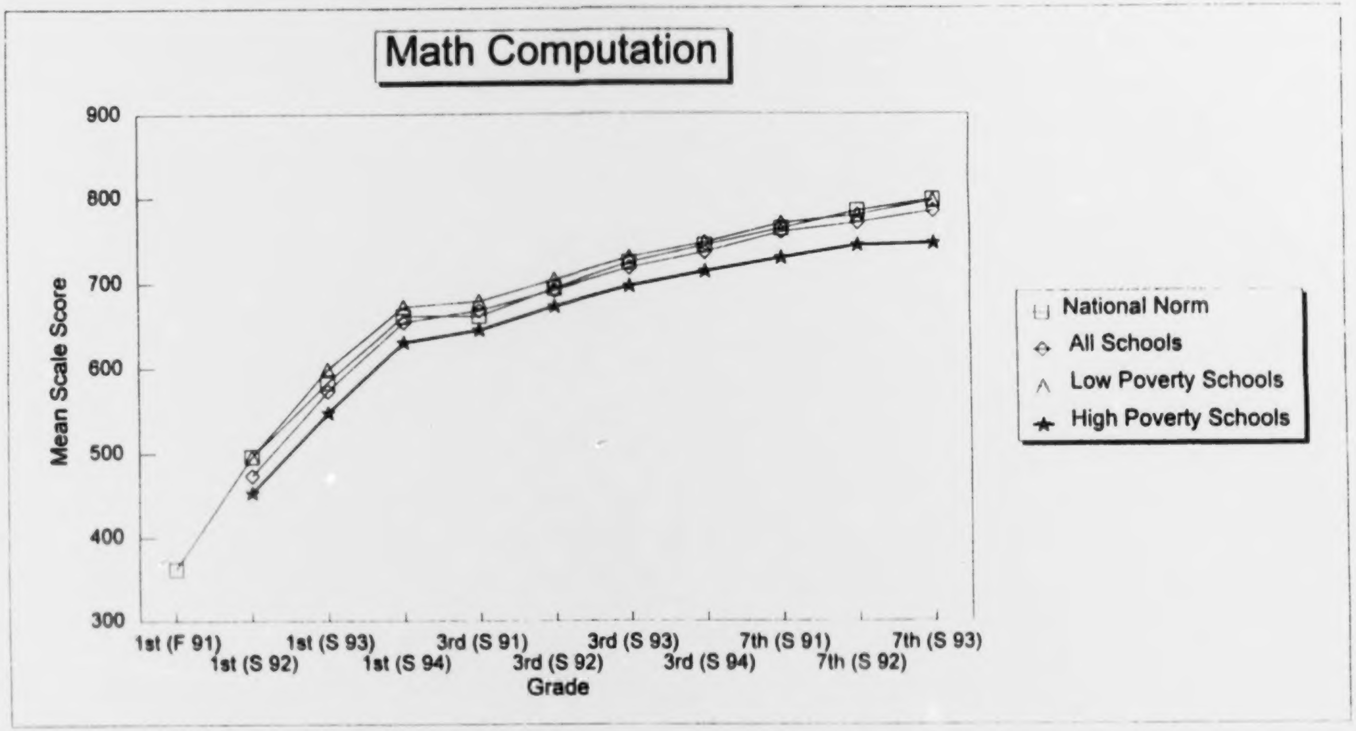
Exhibit 2.1: (continued)



- The CTBS national test norms;
- The total weighted mean derived from the *Prospects* longitudinal analysis sample (labelled "all schools");
- Weighted means for students in high-poverty concentration schools; and
- Weighted means for students in low-poverty concentration schools.

Along the horizontal axis are the different test grades for each of our three study cohorts.[3]

Comparing average scores for high- and low-poverty schools shows, as expected, that children in the poorest schools achieved, on average, substantially below students in the more advantaged schools. For example, in ***reading vocabulary*** the achievement differences or "gaps" amounted to 52 scale-score points at the end of 1st grade, 46 points at the end of 3rd grade, and 43 points at the end of 7th grade. These are very large differences equal to 0.84, 0.94, and 0.98 standard deviations (SD)[4] respectively. The results for the other subtests tell a similar story:

- ***Reading Comprehension***--56 points (0.72 SD), 61 points (1.05 SD), and 34 points (0.77 SD) at the end of 1st, 3rd, and 7th grade respectively.
- ***Math Computation***--34 points (0.63 SD), and 40 points (0.83 SD) at the end of 3rd and 7th grade respectively (this subtest was not administered at the start of 1st grade).
- ***Math Concepts and Applications***--65 points (0.93 SD), 58 points (1.0 SD), and 37 points (0.88 SD) at the end of 1st, 3rd, and 7th grade respectively.

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[3] The labels on the horizontal axis represent the different measurement points for each of the three student cohorts. For example, 1st (S94) is the spring 1994 measurement point for the 1st grade cohort, or the end of the 3rd grade for these students.

[4] Measured in terms of the CTBS norm sample for the test used at each grade level. A difference of one standard deviation is generally considered to be a large effect (Cohen, 1969).

Did these differences in average achievement diminish over time? As also shown in Exhibit 2.1, the answer is clearly no. With regard to each of the reading and math achievement tests we find the following growth patterns:

- *Reading Vocabulary*--the achievement gaps slightly increased in each cohort, from 52 to 54 points in the 1st-grade cohort (0.84 to 1.1 SD), from 46 to 54 points in the 3rd-grade cohort (0.94 to 1.2 SD), and 43 to 44 points in the 7th-grade cohort (0.98 to 1.02 SD).

> *Children in high-poverty schools began school behind their peers in low-poverty schools. This initial gap in academic achievement remained essentially unchanged as students in high-poverty schools moved into higher grades.*

- *Reading Comprehension*--gaps increased in the 1st-grade cohort from 56 to 67 points (0.72 to 1.16 SD), decreased in absolute terms in the 3rd-grade cohort from 61 to 48 points (but increased in relative terms from 1.05 to 1.12 SD), and remained constant at 34 points in the 7th-grade cohort (but also increased in relative terms from 0.77 to 0.87 SD).
- *Math Computation*--the achievement gaps remained unchanged in absolute terms in the 3rd-grade cohort at 34 points (while increasing in relative terms from 0.63 to 0.74 SD), and increased from 40 to 50 points in the 7th-grade cohort (0.83 to 0.98 SD).
- *Math Concepts and Applications*--gaps remained essentially unchanged in absolute terms at 65 points in the 1st grade (increasing in relative terms from 0.93 to 1.16 SD), decreased in absolute terms in the 3rd-grade cohort from 58 to46 points (but again, increasing in relative terms from 1.0 to 1.07 SD), and increased in the 7th-grade cohort from 37 to 48 points (0.88 to 1.17 SD).

These results clearly demonstrate that children in high-poverty schools, on average, started out academically behind students in low-poverty schools and were generally unable to decrease this gap in achievement as they progressed through school.

When assessed against high academic standards, most students failed to exhibit mastery of skills in reading and mathematics. Students in high-poverty schools were, by far, the least able to demonstrate expected levels of proficiency.

Further information on this gap in performance can be derived from the criterion-referenced test data provided by the CTBS. As depicted in Exhibit 2.2, even by the end of our survey period, the majority of children in all schools were unable to master the reading and math skills expected of them at their respective grade levels. For example, even in the least disadvantaged schools by the end of 9th grade, well below one-third of the students were generally able to exhibit mastery of the skills reflected in the CTBS. These results are similar to those reported by the National Assessment of Educational Progress (U.S. Department of Education, 1994).

More important for our purposes is the extent to which students in high-poverty schools were able to master these skills compared to students in low-poverty schools. As Exhibit 2.2 shows, students in high-poverty schools were far less likely to exhibit skill mastery than students in low-poverty schools, and the performance gaps were generally larger in the higher-order skills than in the more basic skills areas.

Student Outcomes and Chapter 1 Participation

We now turn our attention to achievement levels and growth rates for students selected to receive Chapter 1 assistance and compare them to the achievement of nonparticipants. We begin with an examination of simple mean differences, and then extend the analysis using a variety of statistical models.

Exhibit 2.2: Criterion Referenced Reading And Math Test Scores[5] by School Poverty and Grade Cohort: Percent of Students Mastering Each Skill Area (Weighted Means)

SUBJECT AND SKILL AREA	End of 3rd Grade (for 1st-Grade Cohort)		End of 6th Grade (for 3rd-Grade Cohort)		End of 9th Grade (for 7th-Grade Cohort)	
	Low-Poverty Schools (%)	High-Poverty Schools (%)	Low-Poverty Schools (%)	High-Poverty Schools (%)	Low-Poverty Schools (%)	High-Poverty Schools (%)
READING						
Word Meanings	13.8	10.4	9.4	4.8	53.9	15.2
Multiple Word Meanings	38.0	10.4	34.3	4.8	20.2	3.5
Affixes	7.6	2.6	16.7	4.2	N/A	N/A
Words in Context	76.5	34.2	25.4	4.1	28.5	9.1
Passage Analysis	68.7	29.4	35.0	7.3	29.0	5.0
Central Thought	55.4	18.6	29.4	5.6	27.9	5.3
Written Techniques	55.7	23.1	23.7	4.5	19.7	4.3
Critical Assessment	58.0	21.8	34.5	7.6	18.1	4.1
MATHEMATICS						
Addition	78.0	54.5	49.8	38.3	N/A	N/A
Subtraction	46.5	21.4	65.5	44.1	N/A	N/A
Multiplication	85.0	66.9	61.7	37.5	N/A	N/A
Decimals	68.2	43.3	54.7	25.6	42.7	14.3
Numeration	69.1	27.0	40.9	10.1	21.3	4.6
Number Theory	56.2	21.4	18.2	4.2	9.2	1.9
Data Interpretation	67.8	25.8	37.4	9.5	20.8	3.8
Pre-Algebra	63.4	24.6	32.5	8.5	20.9	3.2
Measurement	62.7	23.2	39.2	10.2	16.3	2.6
Geometry	30.1	6.9	29.3	8.4	9.8	3.3

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[5] It is important to note that the skills being assessed change over the different levels of the CTBS and are set by panels of outside experts relative to what children should know at a particular grade. Therefore, skill areas with the same name generally represent different levels of achievement or learning at different grades.

Descriptive Analysis

Exhibit 2.3 contrasts average CTBS scale scores for children who never received Chapter 1 assistance with those who received supplemental help in at least one year during our study period. Not surprisingly, students who received Chapter 1 assistance were selected for this help because they scored low on standardized achievement tests, and our data clearly show this gap in academic ability. For example, if we focus on children in high-poverty schools (the main target of Chapter 1 assistance), the average gaps in Reading Vocabulary and Reading Comprehension ranged from 38 scale score points (0.61 SD) to 43 score points (0.55 SD) at the end of 1st grade, from 29 to 30 points (0.59 to 0.52 SD) at the end of 3rd grade, and from 24 to 26 points (0.55 to 0.59 SD) at the end of 7th grade.

Although not as large a gap compared to reading skills, the gap in math achievement is also large. The difference between Chapter 1 participants and nonparticipants in high-poverty schools was 32 points (0.46 SD) in Math Concepts and Applications, and 17 points in Math Computation (0.25 SD). At the end of 3rd grade the differences were 28 points (0.5 SD) in Math Concepts and Applications, and 20 points (0.37 SD) in Math Computation; by the end of 7th grade the differences were 16 points (0.38 SD) and 6 points (0.13SD) respectively.

Not surprisingly, students selected to receive Chapter 1 assistance scored far lower than their classmates on standardized tests of reading and mathematics. This gap in academic achievement was maintained as the children progressed through school.

By the end of our study period (the end of 3rd grade for the 1st-grade cohort, the end of 6th grade for the 3rd-grade cohort, and the end of 9th grade for the 7th-grade cohort), the achievement gaps were essentially the same in absolute terms, and slightly larger in relative terms. For example, in the 1st-grade cohort, the test score differences in Reading Vocabulary remained at 38 points (increasing from 0.61 to 0.78 SD); and at 43 points in Reading Comprehension (increasing from 0.55 to 0.76 SD);

Exhibit 2.3: Mean CTBS Scale Scores, by Chapter 1 Participation and Grade Level (Weighted Means)

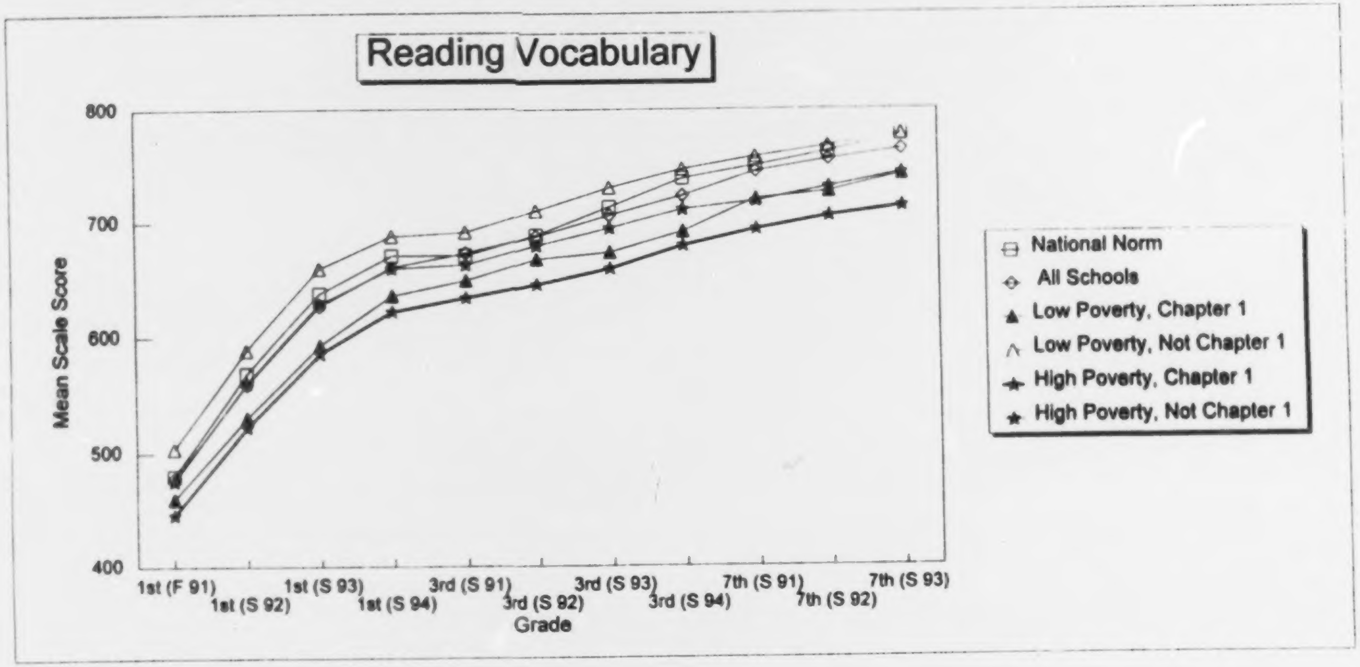


Exhibit 2.3: (continued)

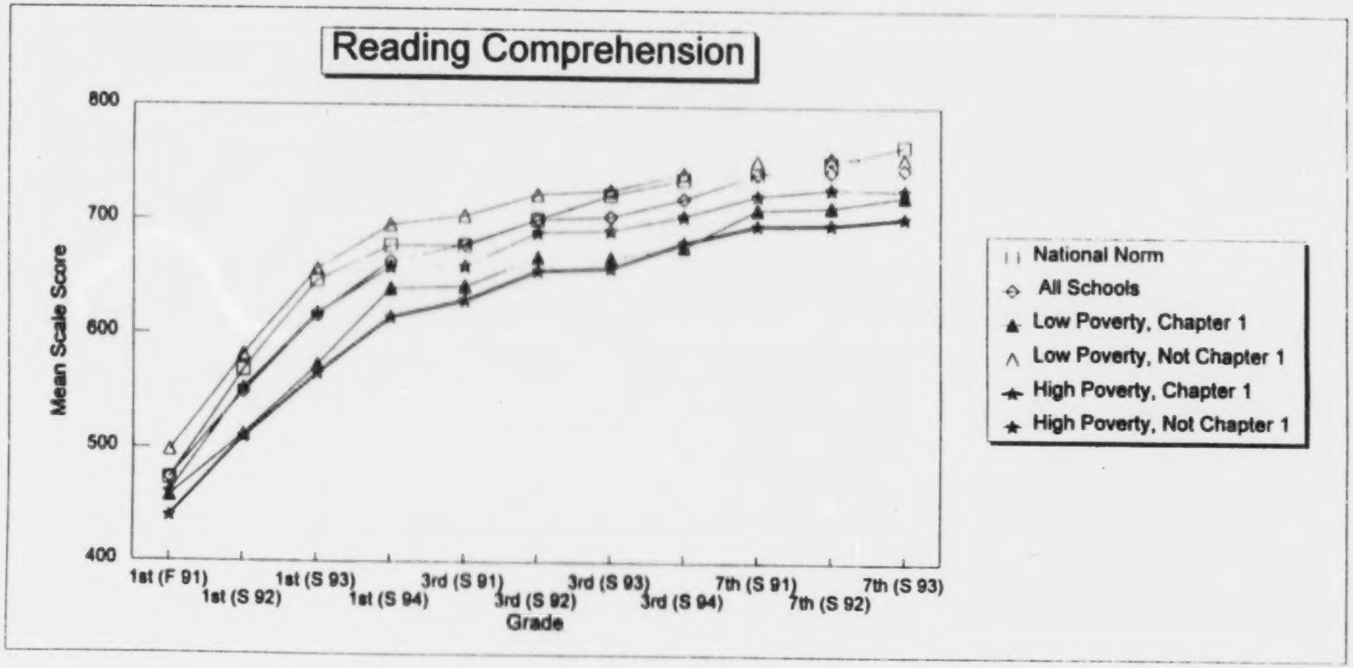


Exhibit 2.3: (continued)

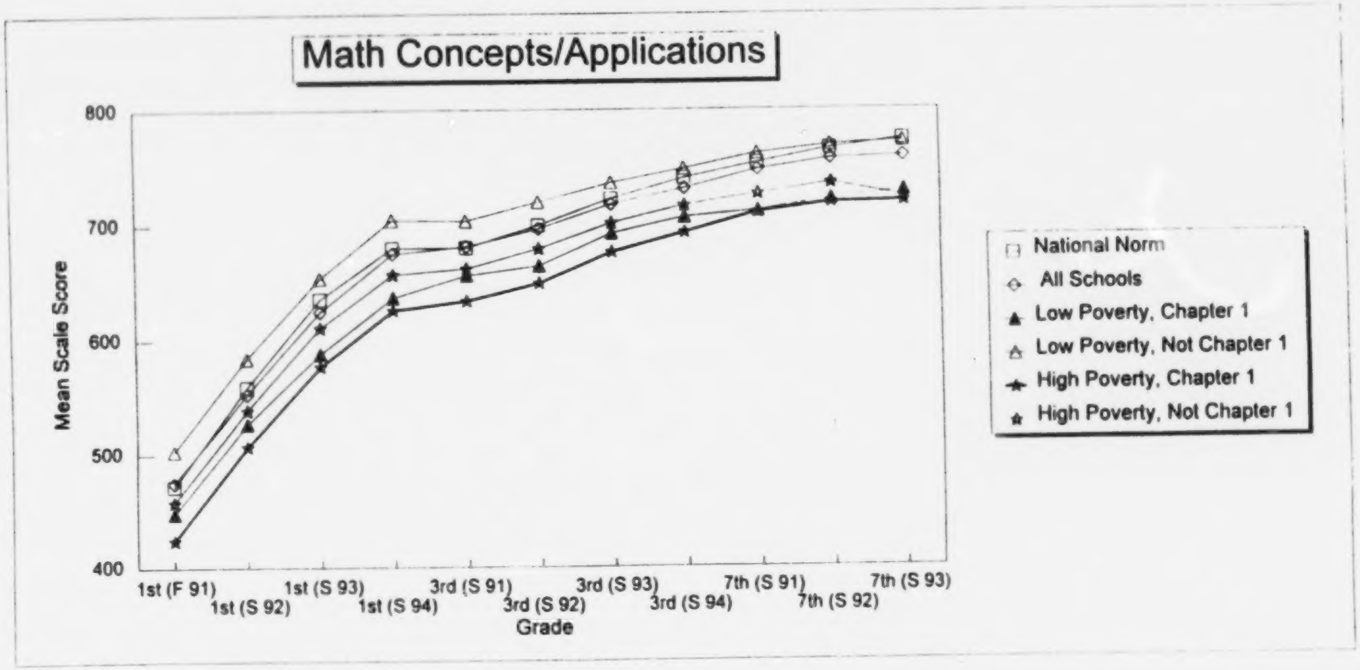
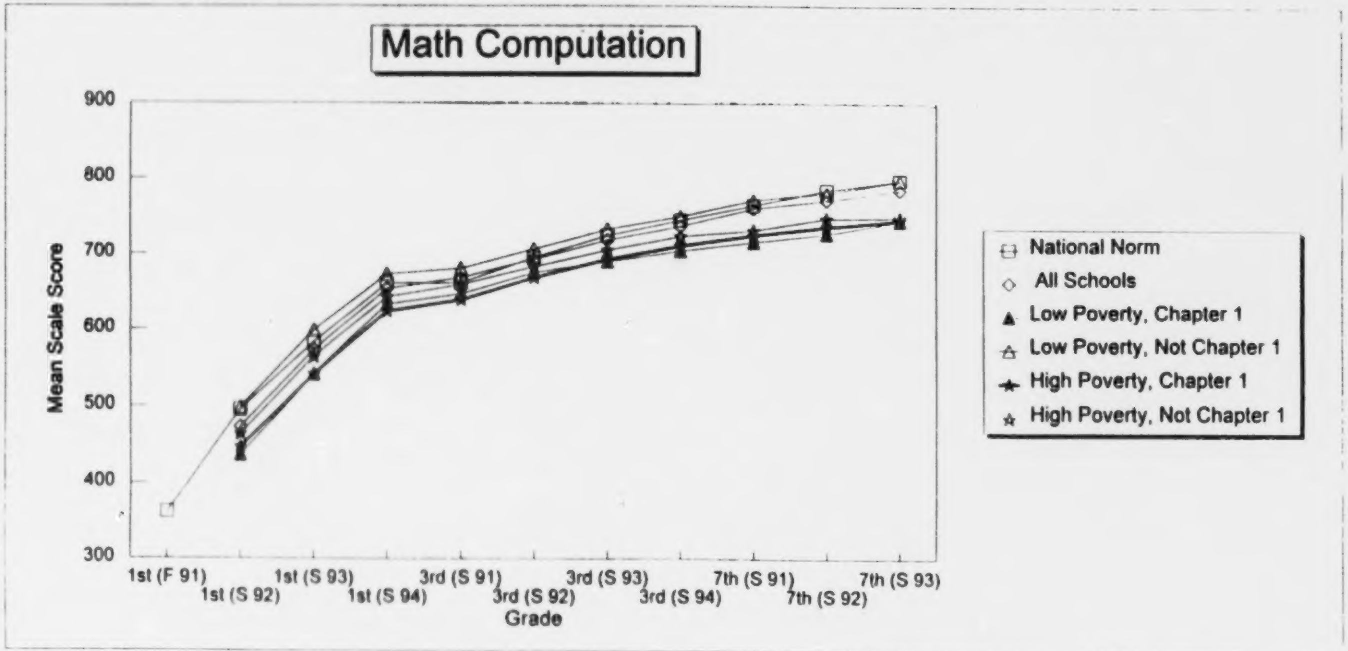


Exhibit 2.3: (continued)



dropped from 32 to 31 points in Math Concepts and Applications (increasing from 0.46 to 0.55 SD); and rose from 17 to 19 points in Math Computation (increasing from 0.25 to 0.35 SD). The patterns in the other grades are largely the same as that observed for the 1st-grade cohort.

For the most part, then, students selected to receive Chapter 1 assistance were performing below their classmates and this achievement gap remained unchanged over time. This finding is explored in more detail below where we attempt to statistically adjust for differences between Chapter 1 participants and nonparticipants.

Multivariate Analysis

The previous descriptive information on differences in academic gains between Chapter 1 and non-Chapter 1 students is problematic because of the inherent noncomparability of these two groups of students. Chapter 1 students were significantly poorer, attended schools with higher concentrations of poor children, and, by the very nature of how they were selected for assistance, scored lower on standardized assessments of academic achievement than nonparticipants. As a consequence, a fundamental problem with an analysis of the impact of Chapter 1 is what researchers call "selection bias." In this instance, students who received Chapter 1 services typically did so because they were having difficulty in school. Therefore, it is not surprising that we find that program participants did worse than nonparticipants.

The difficulty is in finding an adequate comparison group for program participants that will allow us to determine what would have happened to Chapter 1 participants had they not received supplemental academic assistance. Ideally, there would have been random assignment to control and treatment groups, but such a research design was not possible for this study.

As an alternative, we have attempted to compensate for the absence of random assignment by using statistical models to "control for" measurable differences between Chapter 1 participants and nonparticipants. Our intent was to use these various characteristics to statistically adjust non-

Chapter 1 student outcomes so that they accurately represent what would have happened to participants absent the program. Such methods will not, however, produce the same kind of evidence regarding program impacts as would be possible from a study using random assignment. The statistical models represent our best attempt to establish a basis from which to judge the efficacy of Chapter 1. (We will have more to say on this topic at the end of this chapter.)

The statistical approach used, hierarchial linear modeling (HLM), was selected because it properly reflects the multilevel and longitudinal nature of the *Prospects* data to accurately model changes in student outcomes over time. This type of analysis is appropriate when, as in the case of Chapter 1, observed student outcomes are nested in a naturally occurring hierarchy of levels, For example, students were measured at different time points, students were nested within classrooms, classrooms within schools, and schools within districts.[6]

In this particular application, we focused on three levels of this hierarchy.[7] At the first level, outcomes were modeled as a student's individual growth trajectory (i.e., using repeated measures of student outcomes over time). At the second level we captured differences among individual students in their background and family characteristics, as well as in the types of classroom instruction they received. The third level consisted of students nested within schools and captures variations across schools (district characteristics are also incorporated at this level). The statistical results at each level provided two important estimates:

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[6] The main advantage of this approach is that it provides the ability to model processes within students (over time), between students, and between schools simultaneously, with maximum statistical precision at each level. We therefore have a single analysis which models complex processes as they naturally occur. In addition, by estimating separate effects at each level of analysis, we avoid the problem of aggregation bias.

[7] It is conceptually possible to think of the *Prospects* data in terms of a four-level model with individual observations at the first level, the repeated observations across students at the second level, students clustered within classrooms at the third level, and classrooms clustered within schools at the fourth level. We did, in fact, initially begin our analysis with this structure in mind. However, because students changed classrooms every year, and because of the size and complexity of the data set, this type of four-level model was not computationally feasible. Our analysis has indicated that ignoring the classroom level of clustering is likely to have a small or neglible effect on the estimated standard errors.

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- ***average level,*** which is defined as the mean (or average) score at the student's first measurement point; and,
- ***slope,*** or the rate of change in level over time (i.e., across the different measurement points).

For our purposes, we are more interested in the estimated slope because the primary objective of Chapter 1 was to **increase** the growth slopes for participants to allow them to "catch up" with their more advantaged classmates. Furthermore:

- Separate models were estimated for each of the three study cohorts.
- Within grade cohorts, separate analyses were conducted for each of ten different student outcome measures: CTBS scale scores for Reading Vocabulary; CTBS scale scores for Reading Comprehension; CTBS scale scores for Math Concepts and Applications; CTBS scale scores for Math Computation; teacher ratings of student achievement in reading; teacher ratings of student achievement in language arts/English; teacher ratings of student achievement in math; teacher ratings of student classroom participation; teacher ratings of student cooperativeness; and teacher ratings of student attentiveness.
- The time points entered into the models were as follows: 1st-grade cohort: fall 1991 (in certain analyses only), spring 1992, spring 1993, spring 1994; 3rd-grade cohort: spring 1991, spring 1992, spring 1993, spring 1994; and 7th-grade cohort: spring 1991, spring 1992, spring 1993.
- Two measures of Chapter 1 program participation were used: 1) the number of years of Chapter 1 assistance a student received; and, 2) a series of variables that distinguished among various patterns of Chapter 1 participation to determine whether students receiving services early in elementary school achieved more over time relative to students who received either no services or services in later grades. For the first measure of program participation, we focused our attention on the 1st and 3rd grade cohorts because of the relatively small number of Chapter 1 participants in the 7th-grade cohort. For the second measure, we limited our attention to the 1st-grade cohort to reduce the effect of early grade participation.
- Student outcomes were assessed in relation to the type of Chapter 1 assistance a student received. For example, in the models of reading

achievement, the Chapter 1 participation variable represented whether the student received assistance with reading skills.

Four types of analyses were conducted using this statistical method:

- The first included a wide range of student, family, community, school, and classroom characteristics in addition to the previously described measures of Chapter 1 participation.
- The second approach to examining the effect of Chapter 1 added another covariate to the model, i.e., the students' initial fall 1991 test score. This provided an additional level of statistical control to test Chapter 1 program effects independent of the students' initial test score. But, because this test was only available for the 1st-grade cohort our analysis was limited to these students.
- The third approach involved creating a "presumptively eligible" group of students entering 1st grade defined as those students attending schools with 50 percent or more of the children eligible for free or reduced-price meals, **and** who scored at or below the 25th percentile on the fall 1991 CTBS test. We then compared the subsequent outcomes for students in this eligible group who did and did not receive Chapter 1 assistance. Chapter 1 nonparticipants should be better matched to participants in this more narrowly defined comparison group.
- For the fourth approach, we focused on repeated measures of outcomes for individual students who received services in some, but not all, years of the study. This approach was intended to test the extent to which students' standardized test scores were higher in years in which they received Chapter 1 assistance compared to years in which they did not. This analysis was done for both the 1st- and 3rd-grade cohorts.

Initial Analysis of the Effect of Chapter 1 Participation

We now move to our analysis of the effect of Chapter 1 participation on students. As noted above, our first statistical approach involved adding indicator variables measuring different amounts of Chapter 1 program assistance to hierarchical linear models that controlled for a variety of student and school characteristics. If we were able to completely control for the differences between participants and nonparticipants by including these variables in our model, the influence of these variables would show the true impact of Chapter 1 services. In this scenario we would, for example, hypothesize that if two students were equivalent on all measured variables (including their prior test scores), and if one of them received Chapter 1 assistance for an additional year, then the student who received more help should do better than the student who received less help. That is, if all other things were held equal by the model, getting more help should produce greater gains in the selected outcome measures than receiving less help.

Exhibit 2.4 provides the model results by grade cohort and for selected outcome measures.[8] For each grade cohort, results are first presented for the model ***without*** controls for student, family, school, and classroom characteristics (labeled the "base model") and then for the "fully specified" model which includes all the control variables. For each model, the parameter estimates are shown for both the level (i.e., differences in average outcomes between Chapter 1 participants and nonparticipants) and slope effects (i.e., differences in rates of change over time). The cell entries represent the difference between the particular subgroup of students (e.g., 1st-grade cohort with one year of Chapter 1 assistance) and students who did ***not*** receive Chapter 1 assistance in any of the observed years. For example, the first entry for the 1st-grade cohort of "-34" means that students who received Chapter 1 assistance for one year scored, on average, 34 scale-score points in Math Applications ***below*** the average of those students who never received this type of Chapter 1 assistance between the 1st and 3rd grades.[9] Also provided in Exhibit 2.4 for each cohort is the percent reduction in this "gap" that resulted from adding all the covariates to the model (i.e., the percentage difference in level between the base and full models).

Starting with the base model, Exhibit 2.4 shows that across outcome measures students who received ***any*** Chapter 1 assistance have lower achievement scores, and lower teacher ratings, than students who never received this type of help in school. Moreover, those students who

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[8] For brevity, we have selected a subset of the outcome measures. However, the results were consistent across all of the student measures. For complete information see the accompanying Technical Report.

[9] The standard deviations for the CTBS tests range from 40-50 scale-score points.

Exhibit 2.4: Summary of Statistical Model Results With Chapter 1 Amount Variables by Grade Cohort: Base Model vs. Fully-Specified Model

Outcome and Years of Chapter 1 Participation	1st-Grade Cohort					3rd-Grade Cohort				
	Base Model[1]		Full Model[2]		Percent Change in Level	Base Model		Full Model		Percent Change in Level
	Level[3]	Slope[4]	Level	Slope		Level	Slope	Level	Slope	
Math Applications Scale Score										
1	-34[5]	N.S.	-29	N.S.	-15%[6]	-27	N.S.	-22	N.S.	-19%
2	-35	N.S.	-28	N.S.	-20%	-45	2.3	-37	N.S.	-18%
3	-36	N.S.	-27	N.S.	-25%	-47	N.S.	-29	N.S.	-17%
4	--	--	--	--	--	-58	5.0	-46	5.1	-21%
Reading Vocabulary Scale Score										
1	-41	N.S.	-28	N.S.	-7%	-20	N.S.	-17	N.S.	-15%
2	-57	N.S.	-51	N.S.	-11%	-31	-3.0	-24	-4.6	-23%
3	-66	N.S.	-62	N.S.	-6%	-39	-2.7	-20	-3.4	-23%
4	--	--	--	--	--	-47	-2.4	-34	N.S.	-28%
Teacher's Math Achievement Rating										
1	-0.24	-0.10	-0.19	-0.08	-21%	-0.34	-0.05	-0.27	N.S.	-21%
2	-0.39	-0.12	-0.32	-0.10	-18%	-0.61	N.S.	-0.50	N.S.	-18%
3	-0.42	N.S.	-0.35	N.S.	-17%	-0.63	N.S.	-0.56	N.S.	-11%
4	--	--	--	--	--	-0.65	N.S.	-0.56	N.S.	-14%
Teacher's Reading Achievement Rating										
1	-0.39	-0.08	-0.32	N.S.	-18%	-0.44	N.S.	-0.36	N.S.	-18%
2	-0.60	-0.11	-0.50	-0.06	-17%	-0.71	N.S.	-0.54	N.S.	-24%
3	-0.64	-0.13	-0.57	-0.09	-11%	-0.81	N.S	-0.61	N.S.	-25%
4	--	--	--	--	--	-0.88	N.S.	-0.66	N.S.	-43%

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Outcome and Years of Chapter 1 Participation	1st-Grade Cohort					3rd-Grade Cohort				
	Base Model[1]		Full Model[2]		Percent Change in Level	Base Model		Full Model		Percent Change in Level
	Level[3]	Slope[4]	Level	Slope		Level	Slope	Level	Slope	
Reading Teacher's Attention Rating*										
1	-0.22	-0.04	-0.17	N.S.	-23%	-0.22	N.S.	-0.18	-0.007	-18%
2	-0.33	N.S.	-0.30	N.S.	-9%	-0.38	0.04	-0.29	0.03	-24%
3	-0.30	N.S.	-0.34	N.S.	-13%	-0.36	N.S.	-0.30	N.S.	-17%
4	--	--	--	--	--	-0.26	N.S.	-0.29	N.S.	+11%
Math Teacher's Attention Rating **										
1	-0.24	-0.03	-0.12	-0.03	-50%	-0.22	N.S.	-0.18	N.S.	-18%
2	-0.40	N.S.	-0.19	N.S.	-53%	-0.36	0.03	-0.32	0.009	-11%
3	-0.41	N.S.	-0.14	N.S.	-66%	-0.38	N.S.	-0.33	N.S.	-13%
4	--	--	--	--	--	-0.37	N.S.	-0.22	N.S.	-41%

--	Data not available
*	This model uses Chapter 1 participation in reading.
**	This model uses Chapter 1 participation in math
N.S.	Not statistically significant at the 0.001 level.

[1] Base model presents multi-level model results *without* student, family, and school control variables.

[2] Full (or fully-specified) model presents model *with* student, family, and school control variables.

[3] Level refers to the average outcomes for participants relative to non-participants.

[4] Slope refers to the rate of change in level over time.

[5] Reads, "Students who receive one year of Chapter 1 assistance scored 34 scale score points *below* non-particpants on math applications (under the base model)."

[6] Reads, "Adding the control variables to the model reduces the difference between participants and non-participants by about 15 percent."

received more assistance generally scored below those students who received less assistance (i.e., had fewer years of participation). These results do not necessarily indicate a negative impact of the Chapter 1 program. Rather, as previously discussed, they are primarily an indication that the right students are being targeted for help.

It is also the case that, with few exceptions, there were no significant slope effects, and where they were found, the slope effects were often negative.[10] This means that either there were no differences in growth (i.e., no relative change over time), or where there were differences they tended to increase the observed gaps in average performance. What we would have expected to see is a ***positive*** effect on students' rate of growth (i.e., the slope effect) indicating that Chapter 1 assistance was helping close the gaps in student achievement. Again, because of the program's inherent selection bias we cannot conclude that Chapter 1 had no effect -- we simply do not know what would have happened to the participants in the absence of the program, since they are so different from nonparticipants and none of those differences have been removed in this first model. What we can say, however, is that the help they received was generally insufficient to move participating students toward parity with their more advantaged peers (i.e., we found either small, insignificant, or negative slope effects).

After controlling for student, family, and school differences between Chapter 1 participants and nonparticipants, we still find that participants score lower than nonparticipants and that this gap in achievement is not closed over time.

What happens when statistical controls are added to the model? As also shown in Exhibit 2.4, the magnitude of the average (or level) differences between participants and nonparticipants was reduced with the addition of the control variables but did not completely disappear. Participants still consistently scored below nonparticipants. Furthermore, the differences in achievement among students who get more versus less assistance, while generally reduced, persisted in their stratified pattern, i.e., students with the most years of help scored at the lowest level. Finally, with the addition of the statistical controls, the slopes did not become positive. That is, the negative gap between participants and nonparticipants continued over time.

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[10] Where numbers are shown in Exhibit 2.4 the differences were statistically significant at the 0.001 level. We have used this more stringent criterion due to the large number of statistical tests that were conducted.

The statistical models used controlled for a large number of variables and reduced the gap between the different groups of students. But, because there was essentially no effect on the rates of growth when control variables were added, the trajectories remained parallel over time. In other words, students who entered either the 1st or 3rd grade and who were identified to be in need of Chapter 1 assistance scored, or were rated, below those who were not targeted for assistance. Moreover, those students who were targeted for help in multiple years scored below those selected for less assistance. Most students, whether they did or did not receive assistance, exhibited positive changes over time. However, the rates of growth of Chapter 1 and non-Chapter 1 students were similar, indicating that Chapter 1 assistance did not "compensate" for the initial deficiencies of the disadvantaged students.

Modeling the Pattern of Chapter 1 Participation

Exhibit 2.5 provides the same type of results discussed above but uses the pattern, rather than the number of years, of Chapter 1 services that participants received. To minimize the effect of prior participation in Chapter 1 we focused this analysis on the 1st grade cohort. To help make the results more apparent, Exhibits 2.6 and 2.7 show plots of the predicted curves for Reading Vocabulary and Math Concepts and Applications for the "fully specified" model. (The story to be derived from the graphs for the other outcomes is essentially the same.)

> *Where children start out compared to their classmates, largely explains their relative academic standing in later grades. Moreover, Chapter 1 assistance did not reduce the initial gaps in academic achievement between participating and non-participating students.*

What is so striking about these results is again the "lockstep" relationship among the different participation patterns. That is, the initial group differences remained relatively constant over time. Even though the addition of statistical controls brought the curves closer together

Exhibit 2.5: Summary of Statistical Model Results With Chapter 1 Pattern Variables, 1st-Grade Cohort: Base Model vs. Fully-Specified Model

Outcome and Chapter 1 Participation Patterns[1]	1st-Grade Cohort				
	Base Model		Full Model		Percent Change in Level
	Level	Slope	Level	Slope	
Math Applications Scale Score					
100	-31	N.S.	-28	N.S.	-10%
010	-31	N.S.	-36	N.S.	+16%
001	-39	N.S.	-22	N.S.	-44%
101	-41	N.S.	-26	N.S.	-37%
011	-53	N.S.	-34	N.S.	-36%
110	-38	N.S.	-45	N.S.	+18%
111	-48	N.S.	-36	N.S.	-25%
Reading Vocabulary Scale Score					
100	-39	N.S.	-32	N.S.	-17%
010	-38	N.S.	-46	N.S.	+21%
001	-50	N.S.	-37	N.S.	-26%
101	-54	N.S.	-52	N.S.	-4%
011	-59	N.S.	-51	N.S.	-14%
110	-58	N.S.	-50	N.S.	-14%
111	-66	N.S.	-61	N.S.	-8%
Teacher's Math Achievement Rating					
100	-0.20	-.14	-0.22	N.S.	+10%
010	-0.28	N.S.	-0.22	N.S.	-21%
001	-0.26	N.S.	-0.13	-0.13	-50%
101	-0.34	-.12	0.33	N.S.	-3%
011	-0.44	N.S.	-0.31	-3.9	-30%
110	-0.47	-.16	-0.35	N.S.	-26%
111	-0.43	N.S.	-0.36	N.S.	-16%

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Exhibit 2.5: (continued)

Outcome and Chapter 1 Participation Patterns[1]	1st-Grade Cohort				
	Base Model		Full Model		Percent Change in Level
	Level	Slope	Level	Slope	
Teacher's Reading Achievement Rating					
100	-0.27	-0.15	-0.32	N.S.	+19%
010	-0.41	N.S.	-0.45	N.S.	+10%
001	-0.52	N.S.	-0.24	-0.12	-54%
101	-0.51	-0.15	-0.55	N.S.	+8%
011	-0.68	N.S.	-0.45	-0.11	-34%
110	-0.66	-0.14	-0.54	N.S.	-42%
111	-0.65	-0.13	-0.57	-0.08	-12%
Reading Teacher's Attention Ratings*					
100	-0.20	-0.05	-0.16	N.S.	-20%
010	-0.25	N.S.	-0.26	N.S.	+4%
001	-0.21	N.S.	-0.12	-0.07	-43%
101	-0.28	N.S.	-0.24	N.S.	-14%
011	-0.41	N.S.	-0.29	N.S.	-29%
110	-0.34	N.S.	-0.36	0.06	+6%
111	-0.31	N.S.	-0.34	N.S.	+10%
Math Teacher's Attention Ratings**					
100	-0.16	-0.08	-0.11	N.S.	-31%
010	-0.25	N.S.	-0.13	N.S.	-48%
001	-0.32	N.S.	-0.12	N.S.	-63%
101	-0.34	N.S.	N.S.	N.S.	–
011	-0.48	+0.05	-0.18	N.S.	-63%
110	-0.35	N.S.	-0.24	N.S.	-31%
111	-0.41	N.S.	-0.14	N.S.	-66%

* This model uses Chapter 1 participation in reading.

** This model uses Chapter 1 participation in math.

N.S. = not statistically significant at the 0.001 level.

[1] Patterns are defined by whether a student received Chapter 1 assistance in a particular year. For example, "000" = never received assistance, "100" = received assistance in 1st grade, but not in 2nd or 3rd grades.

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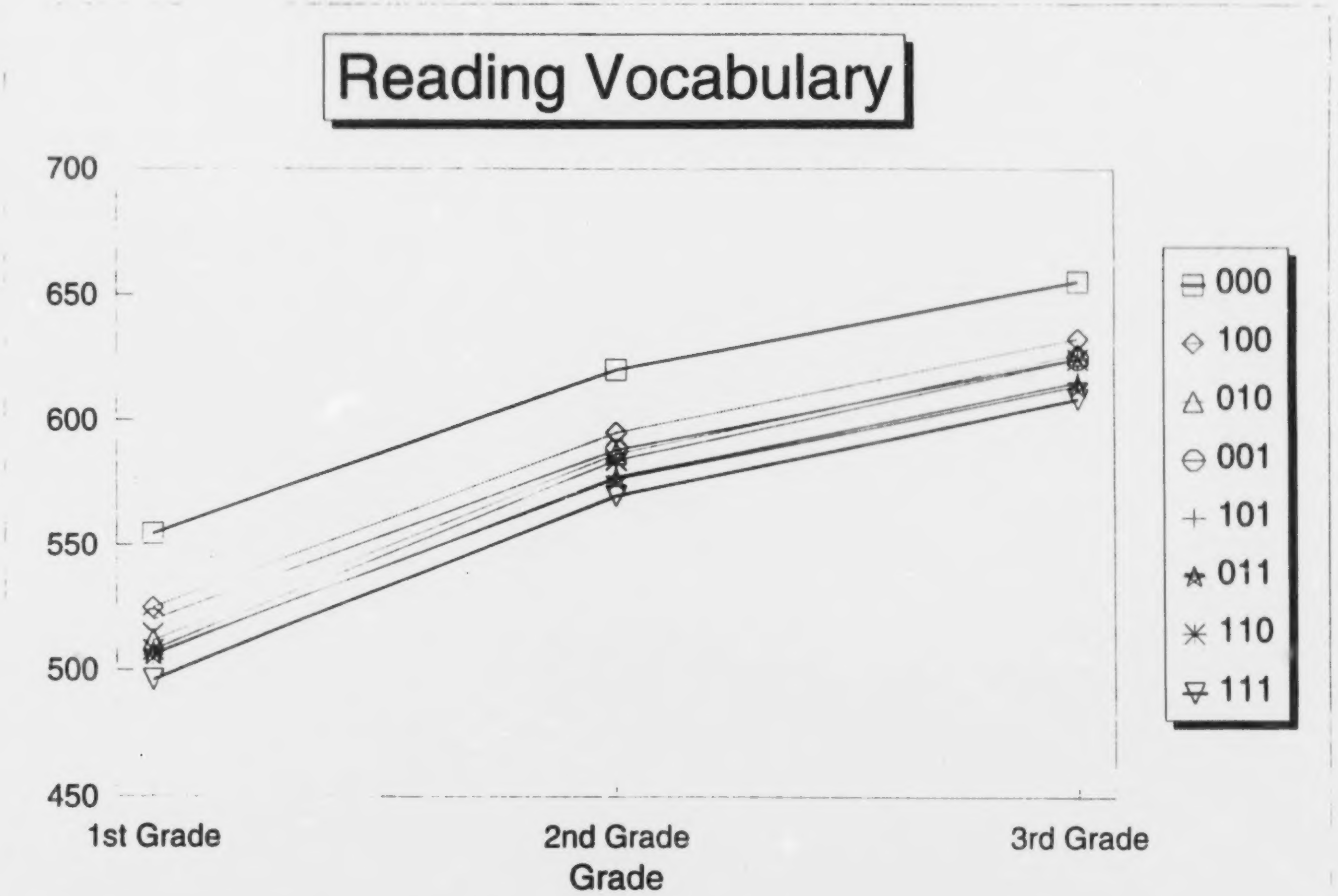
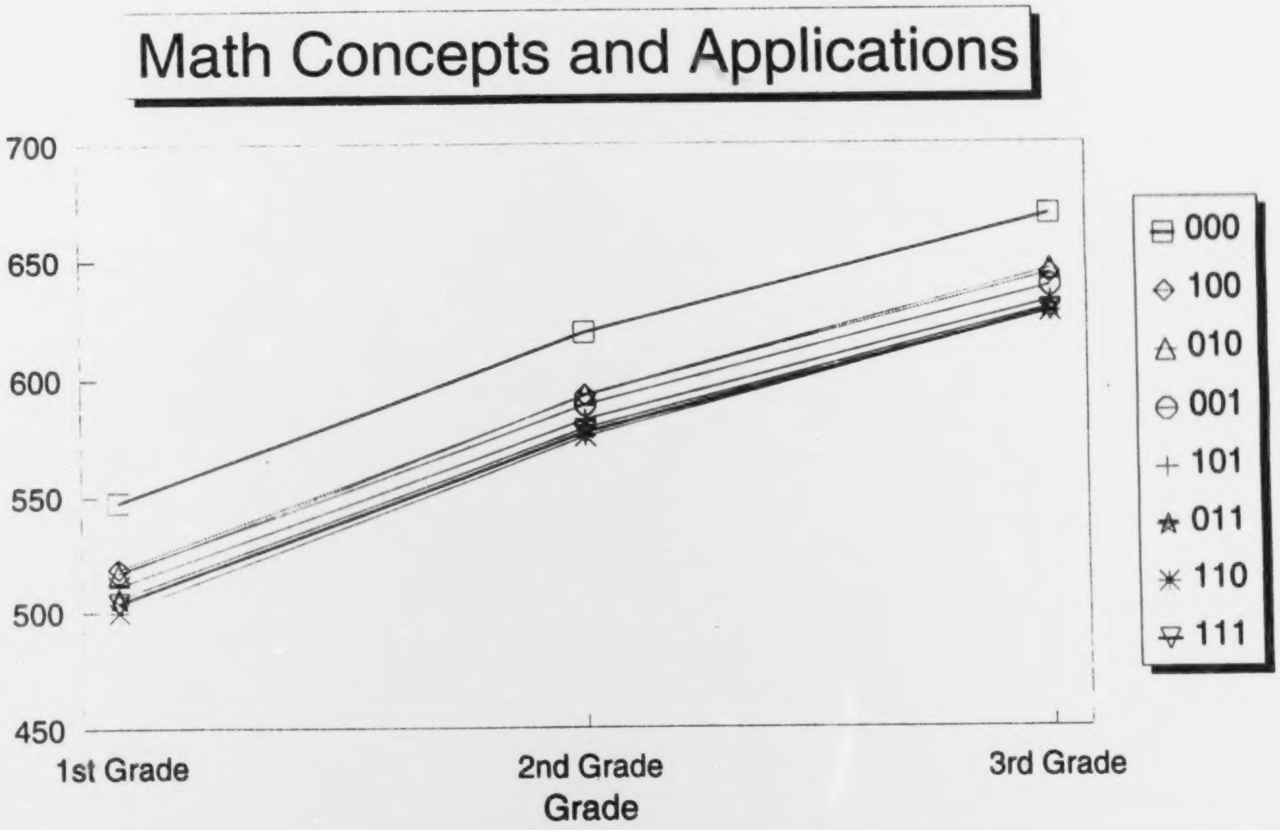
Exhibit 2.6: Estimated Reading Vocabulary Scale Scores, by Grade Level



Patterns are defined by whether a student received Chapter 1 assistance in a particular year. For example, "000" = never received assistance, "100" = received assistance in 1st grade, but not in 2nd or 3rd grades.

Exhibit 2.7: Estimated Math Concepts and Applications Scale Scores, by Grade Level



Math Concepts and Applications

Patterns are defined by whether a student received Chapter 1 assistance in a particular year. For example, "000" = never received assistance, "100" = received assistance in 1st grade, but not in 2nd or 3rd grades.

(i.e., comparing the results for the base and fully-specified models), the lack of an effect on the slope of the curves resulted in the persistence of the initial gaps and the stratification by amount of assistance over the observed years of schooling.

What do we conclude from these results? Apparently, exposure to school, and general maturation, cause most children to grow over time in their level of achievement. However, where they start out has a great deal to do with where they end up relative to other children in their class. Further, Chapter 1 assistance does not reduce the initial gaps in achievement between participating and non-participating students.

Analysis Using A Comparison Group

As discussed above, this stage of our analysis consisted of an attempt to create a group of "presumptively eligible" students entering 1st grade, and to then examine the growth patterns of those students in this group who do, and do not, receive Chapter 1 assistance. To reiterate, those students deemed to be presumptively eligible were those children who 1) attended schools where 50 percent or more of the enrolled students were eligible for free or reduced-price school meals, **and** 2) who scored at or below the 25th percentile on the CTBS standardized achievement test at the start of the 1st grade measured in fall 1991.[11]

Three-level HLM models were again estimated for both Reading Vocabulary and Math Applications, using (as above) measures of both the amount and pattern of Chapter 1 assistance. Because the results for amounts and patterns tell the same story, we have, in the discussion that follows, focused only on the pattern variables. Finally, a second modeling approach was attempted to extend the comparison group analysis by adding the fall 1991 test scores to the models as an additional covariate. This was done to further control for initial differences between the Chapter 1 participants and nonparticipants.

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[11] We tested the comparability of those presumptively eligible students who did and did not receive Chapter 1 assistance, using Ordinary Least Squares (OLS) regression to compare fall 1991 test scores of the selected 1st-grade students who were receiving Chapter 1 in spring 1992 to those who were not receiving such assistance. There were no significant differences between the two groups for CTBS Reading Vocabulary at that time, and a modest significant difference between the two groups for the CTBS Math Concepts and Applications. Thus, this attempt to create comparison groups helped reduce the selection bias for Reading Vocabulary, but did not completely eliminate differences for the CTBS math scales. But it is important to remember, these are not true randomly selected control groups. They have been created through post-hoc analysis and are, as a consequence, still vulnerable to a variety of confounding influences and biases.

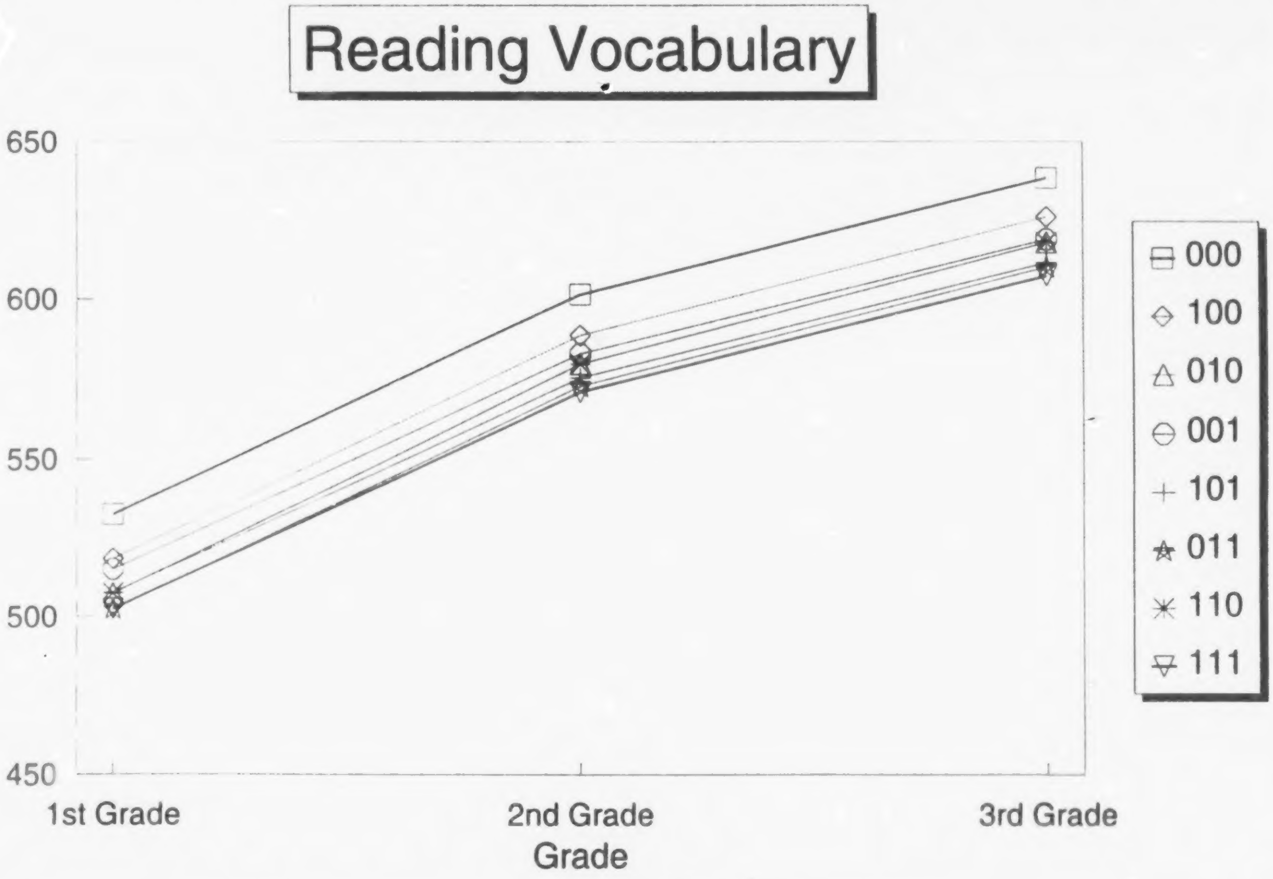
Group Matching Alone. Exhibit 2.8 shows the predicted curves resulting from the estimated models for Reading Vocabulary. Because of our focus on a selected group of low-achieving and economically disadvantaged students, these curves are, on average, lower than those previously presented. However, the results are essentially unchanged. That is, all students exhibited growth over time, but students who received Chapter 1 assistance scored significantly *below* those who did not; and those who received more help scored lower than those who received less. Moreover, because the slope effects were again statistically insignificant, we cannot discern any "compensatory" effect over time associated with Chapter 1 participation.

Exhibit 2.9 shows similar predicted curves for Math Applications. As with achievement scores in reading, all students showed positive growth. But, unlike reading, there were no significant differences in either average level or slope (growth rate) between participants and nonparticipants, and among the different yearly patterns of program participation. This model, then, reduced selection bias enough so that we no longer find *significant* negative effects. However, we still do not discern positive effects from Chapter 1.

Initial Test Score as a Covariate. Adding students' initial test scores to the three-level model somewhat improved the comparability of the groups of participants and nonparticipants. However, despite this improvement the results are essentially the same as those discussed above (see Exhibits 2.10 and 2.11). The only difference is for Math Applications where we find a small, but statistically significant, interaction between grade (i.e., time) and initial test score at the entry to 1st grade. In other words, students who scored lower at entry to school, achieve at a slightly *slower* rate than other students.

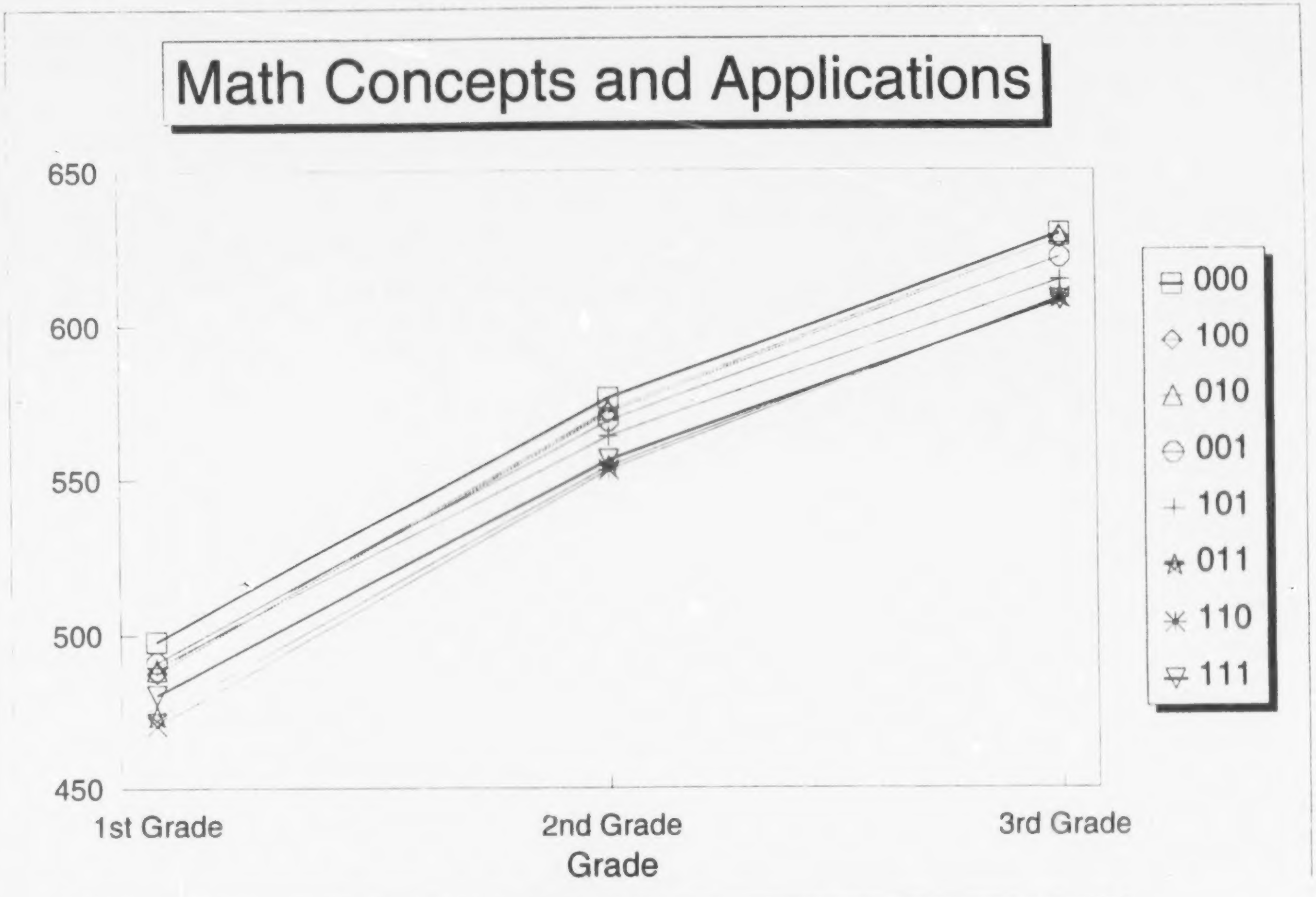
The basic conclusion again is that the effect of Chapter 1 participation is independent of students' growth rates (i.e., there are still no positive slope differences between participants and nonparticipants).

Exhibit 2.8: Estimated Reading Vocabulary Scale Scores, by Grade Level: Comparison Group Analysis



Patterns are defined by whether a student received Chapter 1 assistance in a particular year. For example, "000" = never received assistance, "100" = received assistance in 1st grade, but not in 2nd or 3rd grades.

Exhibit 2.9: Estimated Math Concepts and Applications Scale Scores, by Grade Level: Comparison Group Analysis



Patterns are defined by whether a student received Chapter 1 assistance in a particular year. For example, "000" = never received assistance, "100" = received assistance in 1st grade, but not in 2nd or 3rd grades.

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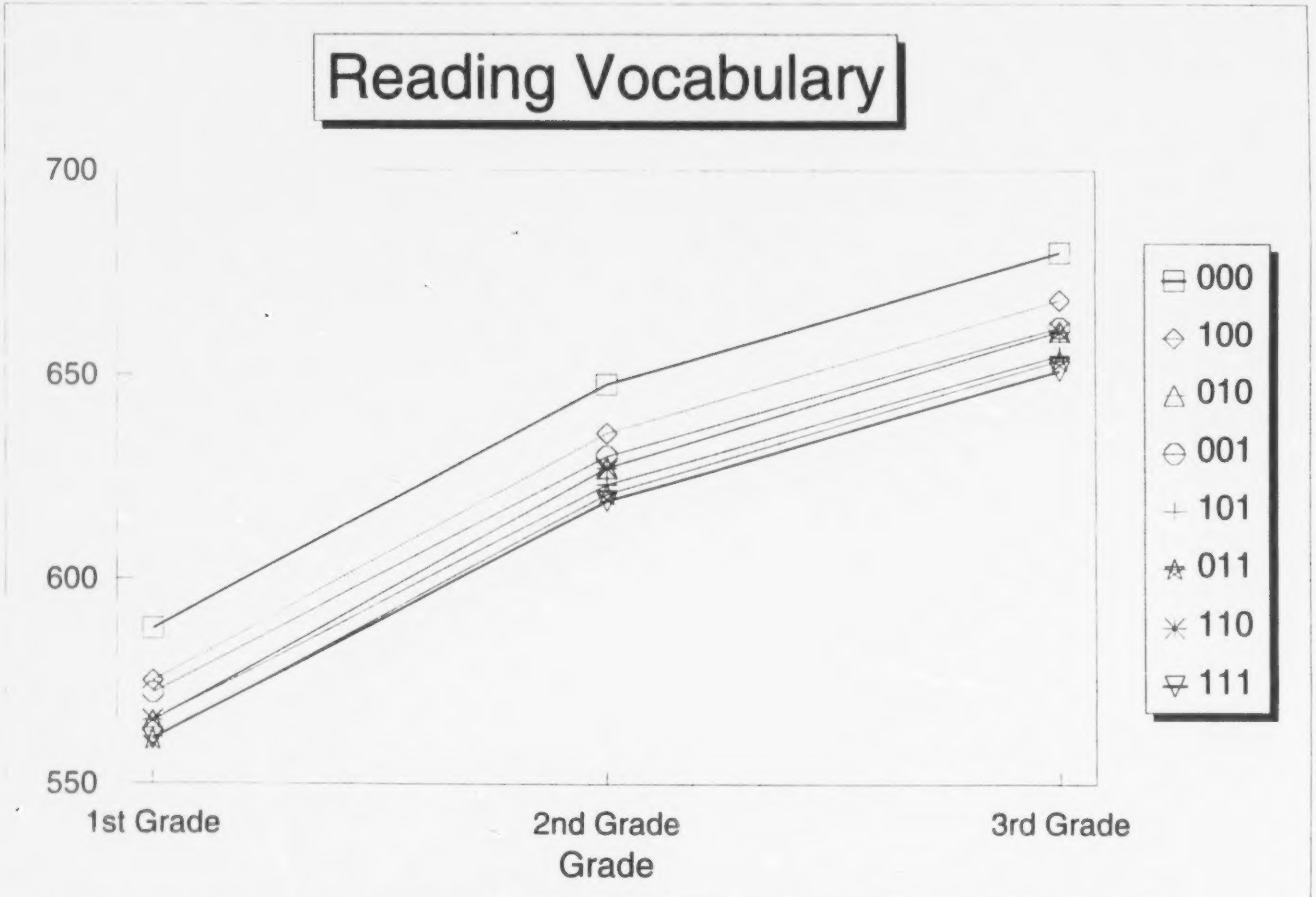
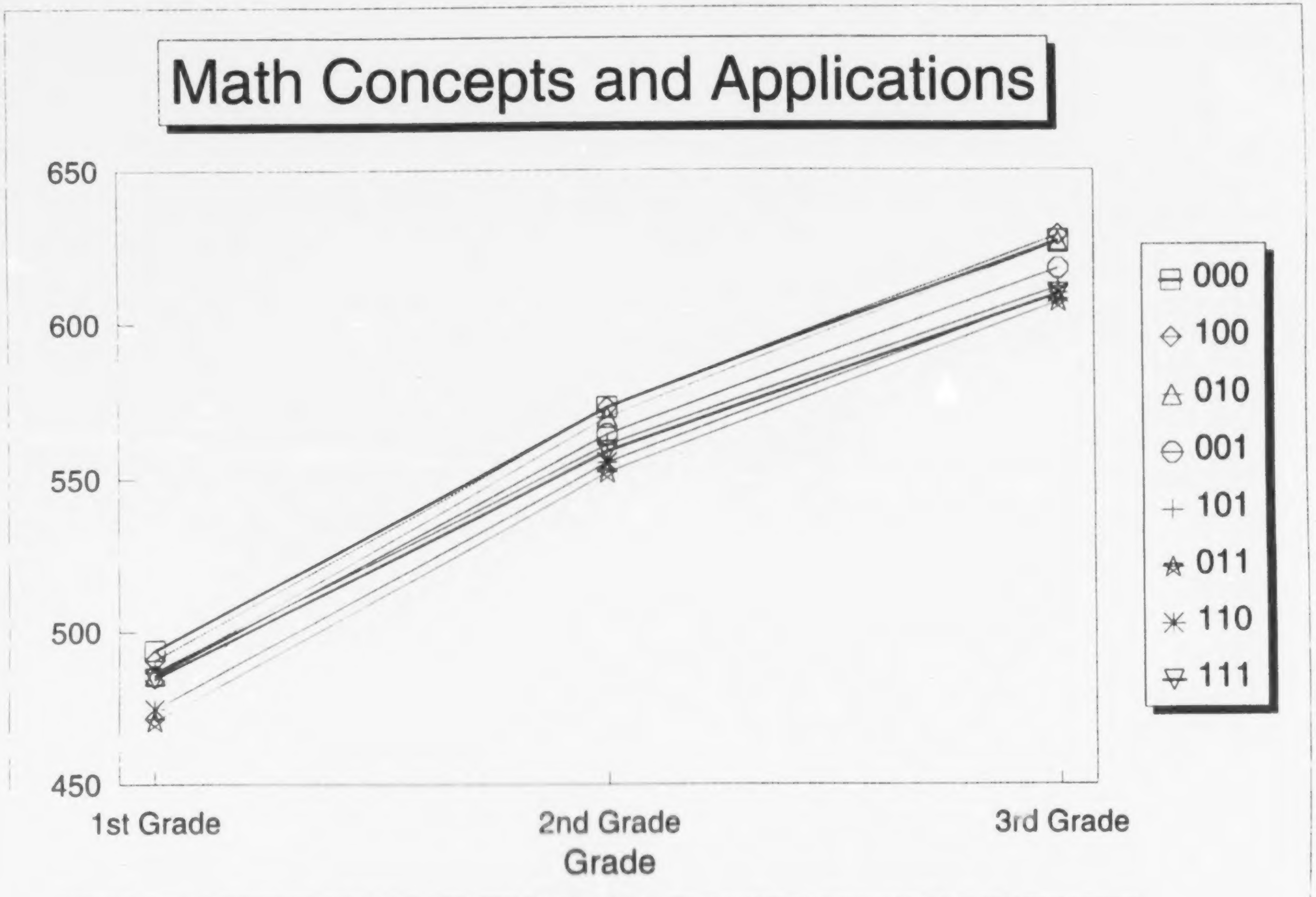
Exhibit 2.10: Estimated Reading Vocabulary Scale Scores, by Grade Level: Comparison Group Analysis With Fall 1991 Test Score



Patterns are defined by whether a student received Chapter 1 assistance in a particular year. For example, "000" = never received assistance, "100" = received assistance in 1st grade, but not in 2nd or 3rd grades.

Exhibit 2.11: Estimated Math Concepts and Applications Scale Scores, by Grade Level: Comparison Group Analysis With Fall 1991 Test Scores



Patterns are defined by whether a student received Chapter 1 assistance in a particular year. For example, "000" = never received assistance, "100" = received assistance in 1st grade, but not in 2nd or 3rd grades.

Within Student Analysis

A final set of analyses involved estimating simple HLM models (without covariates) to test whether scores were higher in years in which students received Chapter 1 assistance compared to years in which they did not receive supplemental help.[12] This was done within the following subgroups of students:

- *1st-grade cohort:* a) those who received assistance in one out of three years and, b) those who received assistance in two out of three years; and

- *3rd-grade cohort:* a) those who received assistance in one out of four years, b) those who received assistance in two out of four years; and, c) those who received assistance in three out of four years.

The results did *not* detect any statistically significant differences from the expected yearly growth in test scores between the years in which students did and did not receive assistance. These results, then, support what was found in the other analyses, i.e., there was no indication in the *Prospects* data that Chapter 1 participation improved students' educational outcomes.

Important Analytical Issues

In interpreting these results on the impact of Chapter 1, two important issues must be kept in mind. First, because Chapter 1 was primarily a *funding mechanism,* local districts and schools could choose to provide Chapter 1 services to students in a variety of ways. Thus the intervention or "treatment" that was the subject of this evaluation did not mean the same thing for all participating students, even among students in the same school. For example, some students could receive additional instruction in reading, for others the support may have been targeted at math skills, and for still others extra help may have been provided in both reading and math. These services could also be delivered in a variety of modes and environments: by pulling the child out of the regular classroom to receive the instruction; by replacing the classroom module (e.g., math instruction) with a Chapter 1 module taught in the same time period in a different classroom; by a classroom aide or certified teacher helping the child in his own classroom; in a before-school, after-school, or summer school program; or in a schoolwide project. In addition, Chapter 1 funds could also be used to support preschool, full-day kindergarten, staff development, and to purchase computer software and hardware and other educational materials. Consequently, Chapter 1 was not a uniform program, but a collection of services and practices provided in participating schools using federal resources.

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[12] The models were estimated for Reading Vocabulary and Math Concepts and Applications under two different analytical scenarios: 1) sampled students were allowed to have their own levels and growth curves (i.e., slopes); and 2) students were fixed at average slopes but allowed to have varying individual levels.

Further, we cannot assume that funds or services labeled "Chapter 1" represented additional resources, or even different services, from those schools or districts would have undertaken without Chapter 1 funds. For example, state and local compensatory education funds, or general education funds, could have been used to provide the same types of services to non-Chapter 1 students as were provided by Chapter 1. Chapter 1 funding was so long established, and so endemic to the U.S. public school system, that the *allocation* of Chapter 1 funds to a school district or school may not have necessarily meant that the resources for that district or school were increased on net -- or even that the funds were used in different ways than they would have been used if they were not labeled "Chapter 1."

The second issue of importance is finding an appropriate comparison group from which to measure program impacts. The methodological question of paramount importance for this study is, "How do we know if Chapter 1 has had a positive impact on students?" The problem of attribution of observed outcomes (e.g., student educational progress) to special services (e.g., Chapter 1 reading instruction) rather than to other contributing factors (e.g., home environment) is at the heart of all research, whether it be in physics, economics, or education policy. Over the last 30 years, social scientists have struggled with this problem of determining whether a particular program contributed to a desired policy result, i.e., whether the outcomes observed for program participants (e.g., increased reading and math achievement) would have been achieved in the absence of the program. This is what is known as the problem of the counterfactual -- measuring what would have happened absent the program. In general, measuring changes for those who received some intervention is relatively easy, but measuring what would have occurred had they not received the assistance is not so simple.

An experimental research approach was not possible for this study. As a consequence, *Prospects* represents a longitudinal study of selected children who did and did not receive Chapter 1 assistance, and who were in schools across the full range of disadvantaged circumstances. Therefore, it is virtually impossible to establish a true natural comparison group, comprising pupils who were exactly like those who received Chapter 1 assistance but who were not served by the program. Using primarily the results of standardized achievement tests,districts selected the most educationally disadvantaged children for services in those schools that had the highest concentrations of poor children. Therefore, naturally occurring comparison groups would include either students in the same high-poverty schools who were measurably less educationally disadvantaged, or in schools that were not receiving Chapter 1 assistance (at least, in the same grade). On average then, a selection of nonparticipants would tend to produce a group of students who were marginally less disadvantaged.

To attempt to deal with this noncomparability, we have used statistical procedures to "control for" measurable differences between participants and nonparticipants. However, statistical techniques are only as good as our ability to measure those characteristics that make the two groups of students different. And, even with perfect measurement tools, one is never certain that all the ways in which students can differ have been accounted for in the analytical model. As a consequence, any conclusions about the effect of Chapter 1 that are derived from this study can only be considered suggestive. Conclusive attribution is simply not possible within the constraints of the study design.

SUMMARY

The initial descriptive analysis of the patterns of student achievement for those children who did and did not receive Chapter 1 assistance indicated a lack of a "compensatory effect." That is, disadvantaged children exhibited growth over time, but they were seemingly unable to close the gap in achievement between themselves and their nondisadvantaged peers.

Chapter 1 served those children who were clearly in need of supplementary educational assistance. But the services appear to be insufficient to allow them to overcome the relatively large differences between them and their more advantged classmates.

This inability to find a compensatory effect of Chapter 1 does not mean the program was a failure. Limitations of this study do not allow us to determine whether Chapter 1 students would have been academically worse off without the assistance they received.

The use of sophisticated statistical techniques to extend this analysis by controlling for measurable differences between participants and nonparticipants provided a more valid basis from which to judge program effects. The key finding from these analyses was that controlling for a variety of student, family, school, and classroom variables did not change the basic descriptive conclusions:

- Students selected to receive Chapter 1 assistance had test scores, or were rated by their teachers, below their nonparticipating classmates;
- Those students who received more Chapter 1 assistance (i.e., more years of service) had test scores, or were rated, below those who received less help; and,
- Chapter 1 students did not, over time, close the performance gap between themselves and their more advantaged classmates.

The first implication to be drawn from these results is that Chapter 1 was, on average, serving those students who were clearly most in need of supplementary assistance. That is, students who received assistance scored below those who did not, and repeated selection for compensatory education was associated with greater educational deficits.

Second, Chapter 1 assistance was, on average, insufficient to close the gap, or compensate for initial achievement differences between advantaged and disadvantaged students. The observed "lockstep pattern" of student growth clearly demonstrated that where students started out, relative to their classmates, is where they ended up in later grades.

Finally, our inability to discern a compensatory effect of Chapter 1 is not necessarily an indication of program failure. As noted above, the design of the *Prospects* study does not allow us to observe directly whether Chapter 1 students would have been worse off (i.e., whether the gap would have widened over time) in the absence of the services they received. In fact, because we might expect the gaps to grow over time, without a special intervention, it may be that Chapter 1 is helping participating students but is too weak an intervention to bring them up to par with their classmates.

CHAPTER THREE

CHARACTERISTICS OF HIGH-PERFORMING HIGH-POVERTY SCHOOLS

A central concern of the current educational reform movement is the performance of students in our nation's most disadvantaged schools. Students in these high-poverty schools generally have the highest rates of dropout from school, and the lowest performance on most indicators of school success and involvement. Moreover, there is a growing understanding that the nation's schools cannot be revitalized by attending to only some of our schools and some of our children. The most difficult challenge facing educators today is to carry out the mandate and promise to educate all children. How do schools respond to this challenge? What practices do they use and are they effective for achieving this end?

The *Prospects* sample of schools provides an unusually rich source of information to describe high-poverty schools generally but also those schools that appear able to produce consistently positive outcomes for disadvantaged students. Specifically, this chapter addresses three important questions:

- How do high-poverty schools differ from low-poverty schools in their organizational and instructional structure, resources, and processes?
- How can we define and identify high-performing high-poverty schools?
- What are the characteristics of such high-performing high-poverty schools? How do high-performing high-poverty schools differ from other high-poverty schools?

A Profile of High-Poverty Schools

Tables provided in Appendix B compare high- and low-poverty schools in the *Prospects* sample on a range of characteristics. Examining these data provides an interesting portrait of the distinctive characteristics of high-poverty schools:

- ***Educational Needs*** -- High-poverty schools were more likely to be located in urban areas, and to enroll a higher percentage of minority students and students who were severely behind in their reading and mathematics performance. These schools also had staffing and absentee problems that seriously curtailed their ability to adequately educate students. In particular, high-poverty schools had the highest rates of teacher and student mobility, and the lowest rates of student attendance. Consequently, those students who needed the most opportunity to learn may in fact have received the least amount of actual instruction. Finally, although some 90 percent of high-poverty schools received Chapter 1 funds, only one-third of them used the schoolwide provision which allows for greater flexibility in targeting the use of these additional funds.

> *High-poverty schools face greater educational challenges than low-poverty schools. These poor schools are generally located in urban areas, and enroll higher percentages of poor and minority students who are severely behind in reading and math. These schools are also characterized by high rates of teacher and student mobility, are more likely to use aides than teachers for instruction, have a less cooperative school environment, and have access to fewer instructional materials.*

- ***School Organization***--High-poverty schools were not different from others in terms of the number of days in the school year, nor in terms of average enrollment. However, reported differences in child/staff ratios and child/teacher ratios suggest that the additional federal resources provided to high-poverty schools were not being used to add more teachers, but were instead being used to add aides in the classroom. With respect to tracking of students to homogeneous ability classes, there were cohort differences: high-poverty schools were more likely to track in grades K-3, about equally likely to track in grades 4-6, and less likely to track in grades 7-9 in comparison to low-poverty schools.

- ***School Leadership***--Principals of high- and low-poverty schools had comparable years of administrative experience, but principals in high-poverty schools had slightly more years of education. Decision-making in high-poverty schools was reported to be slightly less collegial, and more centralized. Principals also perceived slightly less support from teachers, parents, and the community in high-poverty schools.

- ***Parent Expectations and Involvement***--Parents of students in high-poverty schools had significantly lower expectations for their children's educational attainment, and about their children receiving higher-than-average future grades. High-poverty schools also had higher levels of parental involvement in home educational activities, higher numbers of school contacts, lower levels of involvement in school activities, and a lower probability of parents saving money for college. Parents of students in high-poverty schools did not have significantly different overall opinions of the quality of the school than did parents in low-poverty schools.

- ***Classroom Organization and Resources***--There were no significant differences in class size between high- and low-poverty schools, but high-poverty schools were more likely to use aides in the classroom. High-poverty schools were also more likely to use the in-class model for the delivery of Chapter 1 services, and allocated more direct instructional time per week and assigned more homework than other schools. Teachers in high-poverty schools were not different in their use of whole group instruction. But, teachers in high-poverty schools reported having less adequate class materials, and a lower incidence of computer use in their classrooms.

- ***Teachers***--There were no significant differences in educational background, teacher certification, years of experience, or hours of in-service training between teachers in high- and low-poverty schools. Teachers in high-poverty schools gave less favorable ratings of their school's climate, and reported lower levels of perceived influence over school policy.

- ***Instructional Content/Emphasis***--Teachers in high-poverty schools reported more emphasis on advanced math skills with no significant differences in the amount of emphasis on remedial math skills. For reading, teachers in high-poverty schools reported a higher emphasis on remedial and basic skills with no significant differences on the emphasis they placed on reading and writing attitudes (the development of an appreciation of reading and writing) or the integration of reading and writing into other class work.

Identifying and Describing High-Performing High-Poverty Schools

Our effort to identify and define high-performing high-poverty schools involved using the HLM models described in Chapter Three to estimate average achievement levels and gains (slopes) for all high-poverty schools that also had at least 100 sampled students. From this pool of high-poverty schools, "high-performing schools" were then defined as those that had: 1) above average student achievement levels (maintained over time) in both math and reading; and/or 2) above average levels *and* growth slopes in either math or reading. Limiting our attention to students in the 1st- and 3rd-grade cohorts, we identified three schools in the 1st-grade cohort, and three schools in the 3rd-grade cohort that met one or both of these criteria. But, because one school appeared in both grade cohorts, there were actually a total of five different schools identified as high performing.

Data on the five schools are provided in Appendix C. Although we have already shown that, on average, students in high-poverty schools perform poorly on standardized tests relative to students in low-poverty schools, the *Prospects* data also show that there are students in some (albeit few) highly disadvantaged schools that perform quite well relative to their more advantaged peers--schools we refer to as "high-performing." However, descriptions of these schools must be considered only suggestive and any interpretations should be made with great caution. Because of the small sample, we present these data purely as "food for thought" for future research on high-poverty schools, and emphasize that ***no causal attributions*** can be drawn from such descriptions.

Much like high-poverty schools in general, the identified sample of high-performing high-poverty schools served a disadvantaged, diverse, and largely urban population. These schools also served a variety of racial and ethnic populations: two of the five high-performing schools in both cohorts served a majority Hispanic student body; the remaining three schools served very diverse student populations.

The high-performing high-poverty schools had generally lower than average *student* and *teacher mobility* rates. Additionally, three of the five high-performing high-poverty schools had principals with more years experience than the average high-poverty school. Perhaps more significant, all high-performing high-poverty schools had lower than average disciplinary actions. Consequently, high-performing high-poverty schools appeared to distinguish themselves from other high-poverty schools by a more orderly school environment with lower teacher and student turnover, and fewer disciplinary problems despite the challenges of educating a disadvantaged population.

All high-performing high-poverty schools received some form of Chapter 1 funding, and three of the five schools had schoolwide Chapter 1 programs. In addition, all schools practiced tracking of students by ability in the 1st through the 6th grades. Schools that elected to provide schoolwide services differed in some important regards from other eligible schools. These differences are important to keep in mind when considering the role of schoolwide programs in creating high-performing schools. First of all, comparing the *Prospects* schools with schoolwide Chapter 1 programs with those that were eligible for this option but did not elect it, shows that the schoolwides were, on average, more disadvantaged. In particular, schoolwide programs enrolled a higher proportion of poor and minority students, with lower initial test scores, than did the high-poverty schools that did not elect to use this program option.

Moreover, schoolwide status is associated with differences in the operating procedures of the schools. The schoolwides appear to have more decision-making centered in the hands of the school and the teachers than did other high-poverty schools. In addition, there were far fewer disciplinary actions per child in the schools that adopted a schoolwide format, and schoolwide programs had a significantly lower student/teacher ratio than the high-poverty, non-schoolwide programs.

High-performing high-poverty schools also distinguished themselves from other high-poverty schools with regard to parental support, among other resources. One of the most interesting findings is that teachers in the high-performing schools reported a better school climate, and better relations with the school administration and the community. Further, many of the parents at high-performing high-poverty schools appeared to have higher expectations for their child's future educational attainment.

Three out of five high-performing high-poverty schools also appeared to place greater emphasis on instruction in both remedial math skills and advanced math skills than other high-poverty schools. Consequently, these schools appear to have a balanced presentation of basic skills and more cognitively challenging material. Given the ongoing criticism that instruction for disadvantaged children is repetitive, uninspiring, and limited to basic skills, the emphasis on challenging instruction in these schools appears to be important.

There are at least a small number of highly disadvantaged schools in which students are performing better than in other high-poverty schools. These high-performing high-poverty schools are characterized by:

- *more experienced principal,*
- *greater use of the schoolwide Chapter 1 program,*
- *greater use of tracking by student ability,*
- *lower rates of teacher and student mobility,*
- *a balanced emphasis on remedial and higher-order thinking in classroom instruction, and*
- *higher-levels of community, parent, and teacher support for the*

The same strategy of challenging students seems true in the area of reading/language arts. Three out of five of the high-performing high-poverty schools not only emphasized remedial skills, but also focused on higher-order comprehension skills.

SUMMARY

One of the most significant findings from this, albeit limited, analysis is that there are indeed schools serving highly disadvantaged children that are consistently performing above average on achievement outcomes. On the other hand, there are, in this broad survey, only a handful of such schools. Given the small sample size of five high-performing schools found here, we reiterate that caution is obviously necessary in any interpretation of the data for only five schools. This objection aside, there are some consistent patterns of interest:

- Students of differing races and ethnicities, and living in different regions and types of communities, attended high-performing high-poverty schools. Consequently, the schools were effective not just because they had particular types of students enrolled.
- There were few organizational features of schools that were related to effectiveness with the exception of having a schoolwide Chapter 1 program, and greater use of student ability tracking.
- There were specific characteristics of principals and staff that were important. In particular, having a principal with more years of experience and low staff turnover were both associated with the identified high-performing schools.
- Instructional practices and content emphasis may also distinguish high-performing high-poverty schools. Several schools where teachers had adopted a balanced view of remedial skills and higher-order thinking had high-performing disadvantaged students. Rather than viewing instruction in basic skills as a prerequisite for higher-order and more challenging materials, teachers in these schools appeared to generally challenge their students with cognitively demanding material.
- Finally, community, parent, and teacher support for the mission of the school characterized some high-performing schools. It is not clear from our data alone whether support causes success, or is the consequence of it.

CHAPTER FOUR

EXPLORATORY ANALYSIS OF FACTORS ASSOCIATED WITH STUDENT EDUCATIONAL OUTCOMES

Since the appearance of the well-known Coleman report in 1966 (Coleman, et al., 1966), the effect of schools on student outcomes has remained a controversial topic. The most widely debated finding of the Coleman report was that there were few differences between schools in the resources and facilities available to students, and that these aggregate school characteristics had little to do with student performance once family background and student body composition were considered. The report also found that there were appreciable differences in test performance as students entered school, and that these differences were maintained throughout the years of school. These findings were taken to mean that because school-to-school variation in inputs were small, schools could contribute little to closing the initial achievement gap. However, as subsequent research has suggested, differences among schools are related to practices within schools that do matter for student growth. New literature on effective schools has identified processes within some schools that contribute to success with disadvantaged students. One of the characteristics found to be important is a school's culture that supports the belief that all students can achieve at a high level and that academic achievement is the highest priority of the school.

Prospects contributes to this ongoing debate by providing a rich source of data on a large longitudinal sample of students across a wide grade span. This chapter presents an exploratory analysis of the relationships between student, family, and school characteristics and the same student educational outcomes examined in Chapter Three. It is important to point out, however, that this analyses is based on the same HLM models that were discussed in that earlier chapter.

As a consequence the results described below need to be interpreted with some caution. We estimated statistical models with a large number of independent variables because we were primarily trying to control for measurable differences between Chapter 1 participants and nonparticipants. As a consequence, any interpretation of a relationship between a single variable and a particular student outcome is contingent upon all the other variables that were included in the model (the estimated effects are referred to as "marginal" associations). Because our primary purpose was to estimate the effect of Chapter 1 on student outcomes, our statistical models are not necessarily optimal for exploring a specific relationship between some construct of interest (e.g., parental involvement in children's education) and student educational outcomes.

Student vs. School Differences

One of the more striking results of the multivariate analysis of the *Prospects* data is that variation in student outcomes is much larger *within* schools than *between* schools. For example, for standardized tests administered to 1st grade students in reading, 59 percent of the observed variation is attributable to within school differences among students, and 17 percent is associated with differences between schools (the remaining variation is associated with individual student variation over time). These results are essentially the same as those reported earlier by Coleman, et. al., (1966).

> *Differences in academic achievement within schools is far greater than average differences between schools. Consequently, variation in student characteristics accounts for most of the observed differences in student achievement and classroom performance.*
>
> *But, these data also show that all schools have students who exhibit a range of academic achievement levels; poor schools are not filled solely with low-achieving students, nor are low-poverty schools filled solely with high-achieving students. There are good students in all schools, even in the most troubled places, and even the best schools have students for whom academic work is a constant challenge.*

As a consequence, these data clearly show that variation in student characteristics, including family background, account for most of the observed differences in student outcomes. Even so, differences in schools clearly do have an important effect on student achievement and classroom performance. Furthermore, almost all schools have students who exhibit a range of academic achievement levels; poor schools are not filled solely with low-achieving students, nor are low-poverty schools filled solely with high-achieving students. There are good students in all schools, even in the most troubled places, and even the best schools have students for whom academic work is a constant challenge. This finding counters the conventional wisdom and highlights the importance of teaching to the needs of individual students wherever we as educators encounter them.

Correlates of Educational Growth

The next obvious question to ask is, "What factors are associated with higher or lower levels of student achievement and rates of growth over time?" To address this question we examined the estimated multivariate models to determine which variables were found to have a statistically significant relationship with student outcomes (as measured by CTBS test scores as well as teacher ratings of student achievement and classroom behavior). Looking across the three grade cohorts, and across the different outcome measures, we then identified consistent and robust associations that are described below.

Student and Family Demographics

Students come to school with a variety of strengths and weaknesses, and family and contextual characteristics, that are highly correlated with their success in school. In fact, as noted above, differences in student characteristics explain about 59 percent of the overall variation in student achievement test scores. As important as these factors are, however, they can be viewed as essentially fixed variables that are beyond the influence of schools and teachers. Parents send the best children they have to school, and it is the responsibility of the educational system to help them learn.

Student and family characteristics found to be highly correlated with academic achievement include: age relative to classmates (in the early primary grades), race and ethnicity, gender, English language proficiency, student mobility, family income, and parental education.

Consistent relationships of student and family characteristics on student achievement include the following:

- A student's age relative to his/her classmates is associated with test outcomes.[1] In the 1st cohort, children who were younger than their classmates performed less well on standardized achievement tests. However, by 3rd grade the observed age differences disappear, i.e., there are no differences between younger and older students.
- In all three cohorts, student ***race and ethnicity*** are strongly related to all measures of student achievement, teacher ratings of academic competence, and behavioral outcomes.
- ***Gender*** is a significant factor in determining achievement and teacher rating outcomes in all three cohorts. Early in their school career, girls have an advantage in vocabulary development, but this advantage is not maintained over time. Across all cohorts, girls perform less well on the standardized math test and on the teacher ratings of math ability. Teachers, however, rate girls as being more attentive in math as well as in reading.
- Students with visual, hearing, speech, orthopedic or other physical ***disabilities*** generally have lower teacher ratings of their academic and behavioral competence, and lower standardized test scores, than do children without such disabilities. These findings are consistent across all grade levels.
- Students with ***limited-English*** proficiency (LEP) consistently have lower average scores on the standardized tests in reading and math across grade levels than do students who are not limited in their English language ability. Teachers also tend

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[1] There are many reasons for variations in the age of children in the same grade, including district policies concerning required ages for school entry, parental decisions to enroll or delay school entry for a child, and school practices related to retaining and accelerating (i.e., grade skipping) students.

to rate these students lower in their reading competence; and teacher ratings are also lower for math competence but only for lst-grade cohort students.

- ***Student mobility*** (as measured by the number of household moves during our survey period) generally has a negative relationship with standardized achievement test, and teacher achievement and behavioral ratings in the 1st-grade cohort. Mobility was not related to vocabulary development, however. In the 3rd-grade cohort, there are fewer significant relationships between mobility and student outcomes (and these relate only to vocabulary test scores and teacher ratings of reading ability).
- Students with ***health problems*** (as indicated by their teacher) were rated lower on their academic abilities and their behavioral outcomes than students with no health problems.
- Total ***family income*** and ***SES*** (a composite measure of parental education and occupation) are consistently, and positively, related to student achievement test scores and teacher ratings, i.e., higher income and SES are associated with higher levels of performance.
- ***Preschool attendance*** had a positive effect on teacher ratings of academic performance and behavior, as well as on standardized achievement test results for students in the 1st cohort. (Reliable data were unavailable for the 3rd-and 7th-grade cohorts.) This is an important finding that supports the recent increased focus on early childhood education.
- Having a ***single parent*** (in most cases having only one adult in the household) was generally negatively related to teacher ratings and standardized test scores. Children from larger families also performed at a lower level. Both of these relationships were, however, inconsistent across the grade cohorts.

Parent Involvement

A second category of characteristics is related to ***parents' involvement*** in the education of their children. To begin with, ***parental expectations*** for their children's educational attainment are consistently related to school achievement. Parents' assessment of whether their children will attend college or not, and whether they will receive better than average school grades, are both positively and significantly related to scores on standardized achievement tests, and teacher achievement and behavioral ratings. Parents' expectations for whether their child will complete high school are also positively related to student outcomes.

Parents' expectations for their children's success in school are positively related to school achievement.

Parents who were ***more*** *involved with their children's school work were associated with* ***lower*** *levels of student academic achievement. This reflects the greater need for attention and supervision for low-performing students.*

Parents who were more actively engaged in their children's school had children who consistently exhibited better academic and behavioral outcomes.

Various scales were also developed in conjunction with the National Goals Panel. The first scale focused on ***home activities and monitoring***. Parents indicated the frequency with which they were involved in such activities as reading to the child, helping their child with homework, talking with the child about his /her problems or worries, or checking to see if homework was completed. A total of twelve such items were used to construct this composite measure. Students at all grade levels, and for all outcomes, who had parents that were more actively involved in these sorts of home activities did ***less*** well than students whose parents were not so involved with their children. At first glance, these results seem puzzling and contradictory: how can more involvement of the parent be related to lower performance and less favorable teacher ratings? It is important to note, however, that many of the items in this composite ask about activities that comprise monitoring and direct supervision from the parent. One interpretation of these results, then, is that parental involvement as measured by this composite is a response to students who require greater attention and supervision because they have lower achievement scores.

Promoting ***parent involvement with school*** is a prominent goal in current systemic school reform efforts, particularly in the new Title I changes. Three aspects of this objective are captured by the *Prospects* data:

- ***School Contacts With Parents*.** The first measure is the extent to which parents are contacted by the school for a variety of reasons, such as the child's attendance, health issues, and disciplinary matters. Both negative and positive reasons for contact by the school were included in this scale. Not surprisingly, the frequency of contacts by the school is negatively related to all student outcomes in the different grade cohorts (i.e., more contact is generally associated with lower performance).

- ***Parent Participation in School*.** This second scale captures the frequency with which parents participated in such school activities as parent-teacher association meetings, a school event in which the child was involved, and as a volunteer for school projects. Parents who participated more often in the life of the school had children who consistently performed better on the standardized test, and were rated more academically able and attentive by the teachers.

- ***Parent Perception of School Quality*.** Parents assessed their child's school in terms of the extent to which they thought the school placed a high priority on learning, whether they thought their child was challenged at school, and whether they believed they had a say in the setting of school policy. Positive parental ratings of school quality were consistently related to positive school outcomes for children across all outcomes and cohorts.

School and Teacher Factors

School and Teacher Factors comprise the final area of interest that is associated with student outcomes. These variables are clearly the most important as they represent characteristics that can be directly manipulated through school policy and program change. Key findings include the following:

> *School and teacher factors associated with better student outcomes include: lower levels of school poverty, avoiding grade retention, the emphasis teachers place on comprehension and higher-order thinking skills, and lower levels of student disciplinary actions.*

- ***Repeating (or skipping) a grade*** has been frequently, and often heatedly, debated. When retained students are compared to nonretained students at the same age (i.e., retained students' 1st-grade scores are compared to nonretained students' 2nd-grade scores), retained students are found to have lower test scores than their age mates.

- ***Class size*** shows an inconsistent and unexpected relationship with student outcomes. For example, in the 1st-grade cohort, larger class size is positively related to reading outcomes. It is clearly counterintuitive to find that students in larger classes perform better than students in smaller classes, but this result may be appropriate. High-poverty schools have frequently reduced class sizes, especially for reading instruction in the early grades, in an effort to target their resources at an important educational stage. One interpretation then is that high-poverty schools have reduced class size, but achievement in these schools is lower in comparison to more advantaged schools. In other words, even with reduced class size, performance continues to lag at high-poverty schools.

- The presence of ***classroom aides*** during math instruction is positively linked to math achievement on the standardized test, but not to the other student outcomes.

- The availability of ***computers*** in reading instruction appears to have positive effects on standardized achievement outcomes, ratings of competence and attention, but only for the students in the 1st-grade cohort. Interestingly, similar relationships were not found for math instruction.

- ***Instructional time*** was not consistently related to test scores, nor to the teacher ratings of student behavior.

- ***Instructional emphasis[2] in reading/language arts and English*** was measured by creating six composite factor scales: emphasis on remedial instruction; emphasis on comprehension; emphasis on writing attitudes and skills; emphasis on reading attitudes; emphasis on the application of skills in reading; and emphasis on the integration of reading and writing.

  An emphasis on remedial topics (e.g., reading readiness skills, following directions) was *negatively* related to test scores and teacher ratings. Conversely, an emphasis on comprehension, the development of writing skills, and on an appreciation for the importance of writing was *positively* related to student achievement and teacher's rating of attention and reading competence.

  These results suggest that students in classrooms that have a greater emphasis on comprehension and writing, and less emphasis on remedial instruction, perform better on the standardized vocabulary test, and on the teacher performance and behavioral ratings. Of course, despite our best efforts to control for selection factors, in studies of a correlational nature selection bias influences results to an unknown degree. Teachers who have students that are more able may also be more likely to focus on comprehension, that is higher ability levels in the classroom may facilitate the presentation of higher-order thinking skills.

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[2] *Prospects* provides only very limited information on classroom instruction depending primarily on teacher reports of classroom practices.

- ***Instructional emphasis in math***. In the 1st-grade cohort, an emphasis on remedial instruction is positively related to math test scores and to teacher ratings of attentiveness. For the 3rd grade, an emphasis on remedial skills is somewhat negatively related to standardized achievement scores. An emphasis on advanced math is positively related to student test scores in the 3rd-grade cohort, and to teacher ratings in the 1st and 3rd-grade cohorts (i.e., teachers who rate their students as highly competent in math are more likely to provide instruction in advanced math and to rate their students as paying more attention in math).

- A variety of other classroom measures were also examined including: ***student-teacher ratio; measures of the relationship between the teacher and the school administration, community, and staff; extent of perceived support and influence; and staff development time.*** Although these factors are important, especially in current discussions of school reform, the overall pattern of results show inconsistent associations with student outcomes. Clearly, a more detailed analysis of the importance of these factors needs to be carried out in the future.

- The ***poverty level of the school*** (over and above the economic status of an individual student) is negatively related to standardized achievement scores. In contrast, the proportion of black and Hispanic students has inconsistent associations with student outcomes.

- ***School size,*** the number of ***days in the school term,*** and the practice of ***tracking*** by assigning students to classrooms on the basis of similar ability are considered to be important dimensions of school administration and organization. However, these factors were found to have limited and inconsistent connections with student outcomes.

- The number of ***disciplinary actions*** reported in the school exhibited a relatively consistent relationship to achievement and behavioral outcomes for 3rd grade students. Students in schools that had higher numbers of disciplinary actions had lower scores on the standardized tests, and had teachers who were less likely to favorably rate their academic performance (there were no differences for the attention ratings).

- Teachers' ***perceptions of community and school support*** showed inconsistent results, being related to teacher ratings for the 1st grade only.

- The ***decision making practices in the school,*** which are of some interest to current school reform efforts, were found to be related to the achievement outcomes, but in an inconsistent fashion. Teacher ratings of attention in reading for the 3rd-grade was positively linked to this factor; for the 1st-grade cohort it had a positive effect for teacher ratings of reading only.

Summary

The disparate findings discussed thus far tell an important story. To begin with, student differences account for most of the variation in student achievement outcomes. The most consistent predictors of achievement are of the following three types: 1) those that are fixed (e.g., gender, age relative to classmates), 2) those that are associated with poverty (e.g., race/ethnicity, SES), and 3) parental expectations and involvement in school. Of these, only the extent to which parents are actively engaged in their child's school, and their expectations for his/her future success in school, are amenable to change through educational reform efforts. The dominant importance of child and family factors in predicting student achievement outcomes does not mean that school factors, beyond the noted opportunity to target parents, are inconsequential. A variety of other factors are also consistently related to student educational growth, including student retention, the experience and skills of instructional staff, and the emphasis that teachers place on comprehension and high-order thinking skills.

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Appendix A

Technical and Stakeholder
Work Group

Technical Work Group

Richard Duran
Graduate School of Education
University of California, Santa Barbara

Edgar Epps
Department of Education
University of Chicago

Eric Hanushek
W. Allen Wallis Institute
University of Rochester

Lyle Jones
L.L. Thurstone Psychometric Laboratory
University of North Carolina at Chapel Hill

James Lytle
City University of Philadelphia

G. Kasten Tallmadge
RMC Research Corporation

William W. Cooley
Department of Education
University of Pittsburgh

Mary M. Kennedy
National Center for Research on Teacher Education
Michigan State University

Andrew Porter
Wisconsin Center for Education Research
University of Wisconsin at Madison

Brenda Turnbull
Policy Studies Associates

Stakeholders Work Group

Judith Billings
Superintendent of Public Instruction
Washington State Department of Education

Cynthia G. Brown
Resource Center on Educational Equity
Council of Chief State School Officers

Ronald E. Friend
Compensatory Education Branch
Maryland State Department of Education

Richard J. Hardebeck
Texas Education Agency

Phyllis McClure
NAACP Legal Defense Fund

Ronald C. Miller
New York City Public Schools

Evelyn L. Moore
National Black Child Development Institute

Kathleen Plato
Associate Superintendent
Washington State Department of Education

Floraline I. Stevens
National Science Foundation

Sandra Watt
Master Teacher
Baltimore City Public Schools

Robert Witherspoon
National Coalition of Chapter 1 Parents

Federal Agency Personnel

Beatrice Barman
Assistant Director for Education Programs
General Accounting Office

Mary Jean LeTendre
Director of Compensatory Education Programs
U.S. Department of Education

William Lobosco
Associate Director of Compensatory Education Programs
US Department of Education

Dorothy B. Moody
Contract and Grants Office
U.S. Department of Education

Jeffrey Owings
Longitudinal and Household Studies Branch
National Center for Education Statistics

Bayla White
Senior Budget Examiner/Education Branch
Office of Management and Budget

Appendix B

Characteristics of Low- and High-Poverty Schools

Exhibit B.1: Means of School-Level Variables in High-Poverty Schools Compared to Low-Poverty Schools (1st-and 3rd-grade Cohorts)

Variable	Percent Poverty ≥75% N=446 Mean (Standard Deviation)	Percent Poverty ≤ 25% N=400 Mean (Standard Deviation)	t-Test of Difference High vs. Low *=p<.05 **=p<.01 ***=p<.001	All Sample Schools N=1760 Mean (Standard Deviation)
Educational Load				
Percent School Poverty	88.7 (8.2)	12.7 (7.2)	***	50.1 (28.8)
Race: % Black	39.6 (35.7)	5.1 (8.1)	***	20.6 (27.0)
% Hispanic	35.3 (35.1)	6.6 (12.4)	***	19.2 (25.9)
% White	20.6 (24.1)	82.6 (18.5)	***	54.7 (33.0)
% Other	5.4 (9.1)	6.7 (10.8)	NS	6.2 (10.4)
Urbanicity: % Urban	69.0 (46.0)	35.0 (48.0)	***	49.0 (50.0)
:Suburban	18 .0 (38.0)	44.0 (50.0)	***	28.0 (45.0)
:Rural	14.0 (34.0)	22.0 (41.0)	***	23.0 (42.0)
Region: % Midwest	6.0 (23.0)	21.0 (40.0)	***	12.0 (33.0)
% Northeast	22.0 (42.0)	26.0 (44.0)	NS	20.0 (40.0)
% South	49.0 (50.0)	26.0 (44.0)	***	42.0 (49.0)
% West	23.0 (42.0)	27.0 (45.0)	NS	26.0 (44.0)
Percent below 25th percentile in Reading	30.2 (16.3)	10.6 (8.4)	***	19.9 (13.5)
% LEP Students	18.6 (23.4)	2.0 (5.4)	***	8.6 (15.8)
Percent Student Mobility	19.0 (12.3)	7.7 (6.4)	***	14.0 (10.8)
Percent Teacher Mobility	8.0 (27.0)	2.0 (12.0)	***	4.0 (20)
Percent Receiving Chapter 1 Funding	90.0 (30.0)	29.0 (45.0)	***	66.0 (47.0)
Percent Schoolwide Chapter 1	33.0 (47.0)	0.00 (0.05)	***	8.0 (28.0)
Average Number of Disciplinary Actions/Student	0.13 (.22)	0.09 (.14)	NS	0.12 (.18)

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Exhibit B.1: Continued

Variable	Percent Poverty ≥75% N=446 Mean (Standard Deviation)	Percent Poverty ≤ 25% N=400 Mean (Standard Deviation)	t-Test of Difference High vs. Low *=p<.05 **=p<.01 ***=p<.001	All Sample Schools N=1760 Mean (Standard Deviation)
Attendance Rate	92.0 (6.4)	95.2 (3.6)	***	93.7 (4.9)
School Organization				
Number School Days	178.9 (4.8)	179.2 (3.0)	NS	178.9 (4.3)
School Size[1]	3.8 (1.5)	3.7 (1.6)	NS	3.8 (1.5)
Child/Staff Ratio	13.5 (4.5)	14.7 (4.5)	***	14.1 (4.4)
Child/Teacher Ratio	24.9 (6.7)	22.3 (5.5)	***	23.4 (6.2)
Use of Tracking[2]: K-3	0.36 (.48)	0.28 (.45)	**	0.30 (.46)
Use of Tracking: 4-6	0.35 (.48)	0.31 (.46)	NS	0.31 (.46)
Use of Tracking: 7-9	0.50 (.50)	0.74 (.44)	***	0.66 (.47)
Goals, Policies, and Leadership				
Decentralized Decision Making[3]	3.4 (.38)	3.5 (.35)	***	3.5 (.37)
Lack of Support[4]	1.6 (.27)	1.4 (.26)	***	1.5 (.26)
Coordinate Chapter 1 w/ Regular Instruction[5]	2.5 (.68)	2.3 (.48)	***	2.4 (.62)
Principal's Education[6]	4.8 (.81)	4.6 (.81)	**	4.7 (.77)
Principal's Experience: Number of Years at School	5.9 (5.1)	6.5 (5.4)	NS	6.1 (5.1)
Principal's Experience: Total Years	11.3 (6.9)	12.1 (7.3)	NS	11.6 (6.9)

NS= Not significant

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[1] Based on categories of total enrollment – higher numbers indicate larger enrollment.

[2] The proportion of schools that use tracking in this grade span.

[3] A multi-item scale; higher numbers indicate more decentralized decision-making.

[4] A multi-item scale; higher numbers indicate a less supportive environment.

[5] Based on categories of frequency of staff coordination, e.g., 01 = Daily, 02 = Weekly, 03 = Monthly.

[6] Based on categories of educational attainment, e.g., 01 = less than BA; 04 = Masters; 06 = Doctorate.

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Exhibit B.2: Means of Student and Instructional Variables in High-Poverty Schools Compared to Low-Poverty Schools (1st-and 3rd Grade Cohorts)

Variable	Percent Poverty ≥75% N=403 Mean (Standard Deviation)	Percent Poverty ≤25% N=1032 Mean (Standard Deviation)	t-Test of Difference High vs. Low *=p<.05 **=p<.01 ***=p<.001	All Sample Schools (Cohort 1&3) N=1435 Mean (Standard Deviation)
Family/Child-Family/School				
Percent of Parents Who Saved Money for College	38.0 (41.)	57.0.0 (45.0)	***	45.0 (43.0)
Percent of Parents Who Expect Child to Graduate College	52.0 (42.0)	74.0 (40.0)	***	59.0 (43.0)
Percent of Parents Who Expect Future Grades to be Above Average	34.0 (40.0)	53.0 (44.0)	***	41.0 (42.0)
Percent of Parents Who Expect Child to Graduate High School	82.0 (33.0)	96.0 (18.0)	***	88.0 (28.0)
Parent Involvement: Frequency of Home Activities[1]	1.67 (.27)	1.78 (.38)	***	1.73 (.32)
Average Number of School Contacts With Parent	1.38 (.17)	1.33 (.21)	***	1.36 (.18)
Parents' Opinions of School[2]	1.81 (.30)	1.79 (.29)	NS	1.81 (.29)
Parent Involvement: Frequency of School Activities[3]	1.53 (.24)	1.63 (.29)	***	1.57 (.27)

NS= Not Significant

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[1] A multi-item scale of different home educational activities; lower numbers indicate greater frequency of parent-child interaction.

[2] A multi-item scale: lower numbers indicate a more favorable opinion of the school.

[3] A multi-item scale of different types of school activities; higher numbers indicate more frequent participation

Exhibit B.2: Continued

Variable	Percent Poverty >75% N=403 Mean (Standard Deviation)	Percent Poverty <25% N=1032 Mean (Standard Deviation)	t-Test of Difference High vs. Low *=p<.05 **=p<.01 ***=p<.001	All Sample Schools (Cohort 1&3) N=1435 Mean (Standard Deviation)
Classroom Organization/Resources				
Class Size	23.9 (5.1)	23.6 (5.3)	NS	23.7 (5.17)
Percent Chapter 1 Students /Class	33.9 (22.6)	10.2 (13.3)	***	20.9 (19.6)
Percent Chapter 1 Students Served In Class	23.9 (24.4)	5.6 (12.3)	***	13.2 (19.2)
Percent Chapter 1 Students Served Out of Class	14.2 (15.0)	5.1 (7.0)	***	9.75 (11.7)
Aide in Class	0.30 (.36)	0.17 (.30)	***	0.22 (.33)
Percent Whole Group Instruction	54.4 (13.8)	57.5 (16.5)	*	55.6 (15.3)
Average Hours of Assigned Homework Per Week	1.81 (.64)	1.38 (.59)	***	1.53 (.63)
Average Instruction Time (Minutes/Week)	278.7 (91.1)	255.9 (95.4)	**	261.1 (96.0)
Percent of Teachers Who Had Adequate Class Materials	77 (31)	93 (20)	***	84 (27)
Percent of Teachers Who Use Computers in Class	80 (27)	89 (20)	***	85 (24)
Teacher				
Years of Teaching Experience	13.9 (6.1)	15.0 (7.0)	*	14.2 (6.36)
Teacher Education [4]	3.25 (.66)	3.27 (.69)	NS	3.23 (.65)
Hours of In-Service Training/Year	2.82 (.61)	2.82 (.70)	NS	2.86 (.66)
Teacher Certified (1 = Yes)	0.92 (.21)	0.95 (.17)	NS	0.94 (.17)

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[4] Based on categories of educational attainment, e.g., 01 = less than a BA; 04 = Masters; 06 = Doctorate.

Exhibit B.2: Continued				
Variable	Percent Poverty >75% N=403 Mean (Standard Deviation)	Percent Poverty <25% N=1032 Mean (Standard Deviation)	t-Test of Difference High vs. Low *=p<.05 **=p<.01 ***=p<.001	All Sample Schools (Cohort 1&3) N=1435 Mean (Standard Deviation)
School Climate: Relations w/Administration[1]	4.49 (.81)	4.74 (.84)	***	4.59 (.82)
Community Climate[2]	4.45 (.66)	4.78 (.67)	***	4.59 (.69)
Teacher Influence[3]	3.75 (.89)	4.15 (.86)	***	3.95 (.89)
Opportunity to Learns: Math Emphasis[4]	▨	▨	▨	▨
Remedial Skills	2.54 (.29)	2.52 (.24)	NS	2.52 (.27)
Higher-Order Thinking	2.50 (.27)	2.48 (.25)	NS	2.47 (.26)
Advanced Math	1.19 (.37)	1.11 (.36)	**	1.14 (.36)
Math Attitudes	2.46 (.25)	2.48 (.22)	NS	2.46 (.24)
Opportunity to Learn: Reading Emphasis[5]	▨	▨	▨	▨
Remedial Skills	2.36 (.27)	2.21 (.29)	***	2.27 (.29)
Comprehension	2.58 (.26)	2.50 (.29)	***	2.54 (.29)
Application	1.64 (.44)	1.52 (.42)	***	1.56 (.45)
Reading Attitudes	2.86 (.21)	2.83 (.29)	NS	2.85 (.23)
Writing Attitudes	2.21 (.46)	2.10 (.54)	**	2.15 (.52)
Reading-Writing Integration	2.21 (.42)	2.23 (.43)	NS	2.21 (.44)

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[1] Multi-item scale; higher numbers indicate better relationships.

[2] Multi-item scale; higher numbers indicate better cooperation.

[3] Multi-item scale; higher numbers indicate greater influence over school policy.

[4] Four multi-item scales; higher numbers indicate greater instructional emphasis.

[5] Six multi-item scales; higher numbers indicate greater instructional emphasis.

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Appendix C

Characteristics of High-Performing High-Poverty Schools

Exhibit C.1: Comparison of School-Level Characteristics, High-Performing High-Poverty Schools and All High-Poverty Schools[1]

Variable		Cohort 1			Cohort 3			All High-Poverty Schools N=446 Mean (Standard Deviation)
		A	B	C	D	E	F	
EDUCATIONAL LOAD								
Percent School Poverty		89.7	76.0	86.3	85.0	76.0	79.0	88.7 (8.2)
Race:	% Black	0.00	28.8	1.3	15.0	28.8	43.3	39.6 (35.7)
	% Hispanic	98.3	25.6	97.0	28.0	25.6	20.5	35.3 (35.1)
	% White	1.8	40.1	1.3	46.0	40.1	24.8	20.6 (24.1)
	% Other	0.8	5.6	0.5	11.0	5.6	11.4	5.4 (9.1)
Urbanicity:[2]	% Urban	1	0	1	1	0	1	.69 (.46)
	% Suburban	0	0	0	0	0	0.00	.18 (.38)
	% Rural	0	1	0	0	1	0	.14 (.34)
Region:[2]	% Midwest	0	0	0	0	0	0	.06 (.23)
	% Northeast	0	0	0	1	0	1	.22 (.42)
	% South	1	1	1	0	1	0	.49 (.50)
	% West	0	0	0	0	0	0	.23 (.42)
Percent Below 25th Percentile: Reading		19.7	18.0	30.0	20.0	18.0	23.0	30.2 (16.3)
Percent LEP Students		39.0	0	25.0	4.0	0	7.0	18.6 (23.4)
Percent Student Mobility		7.2	3.9	8.4	5.3	3.9	20.7	19.0 (12.3)
Percent Teacher Mobility		0.0	0.0	0.0	0.0	0.0	0.0	.08 (.27)

[1] Schools A and B/E (this is the school that appeared in both student cohorts) had above average achievement levels maintained over time in both math and reading. We refer to these as "high-level schools." On the other hand, School C in the 1st-grade cohort had higher than average gains (or slope) *and* level in math, and higher than average level in reading. We refer to this site as a "high-slope and high-level school." Similarly, School D in the 3rd-grade cohort is a high-level school," and School F is a high-slpoe and high-level school."

[2] 1 = Yes; 0 = No.

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Exhibit C.1: Continued

Variable	Cohort 1 A	Cohort 1 B	Cohort 1 C	Cohort 3 D	Cohort 3 E	Cohort 3 F	All High-Poverty Schools N=446 Mean (Standard Deviation)
Schoolwide Chapter 1 (1 = Yes)	1.0	0.0	1.0	1.0	0.0	0.0	0.33 (.47)
Average Number of Disciplinary Actions/Student	0.0	.02	0.0	.03	.02	0.0	0.13 (.22)
Number School Days	180	160	180	180	160	180	178.9 (4.8)
Attendance Rate	91.0	95.8	91.4	95.7	95.8	92.9	92.0 (6.4)
SCHOOL ORGANIZATION							
School Size	3	3	6	2	3	4	3.8 (1.5)
Child/Staff Ratio	11.6	11.1	14.9	8.5	11.1	14.4	13.5 (4.5)
Child/Teacher Ratio	32.9	23.1	24.5	25.2	23.1	26.7	24.9 (6.7)
Use of Tracking: K-3 (1 = Yes)	1	1	1	1	1	1	0.36 (.48)
Use of Tracking: 4-6 (1 = Yes)	1	1	1	1	1	1	0.35 (.48)
Use of Tracking: 7-9 (1 = Yes)	0	1	0	0	1	1	0.50 (.50)
GOALS, POLICIES, LEADERSHIP							
Decentralized Decision Making	3.87	3.14	3.41	3.19	3.14	3.04	3.4 (.38)
Lack of Support	1.28	1.45	1.50	1.65	1.45	1.36	1.6 (.27)
Coordinate Chapter 1 w/ Regular Instruction	3.1	1.0	2.5	2.5	1.0	2.2	2.5 (.68)
Principal's Education	4.7	5.0	4.5	4.3	5.0	6.0	4.8 (.81)
Principal's Experience: Years at School	8.7	8.7	2.5	3.0	8.7	22.0	5.9 (5.1)
Principal's Experience: Total Years	8.7	11.7	12.8	4.5	11.7	28.0	11.3 (6.9)

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Exhibit C.2: Comparison of Student, Family, and Instructional Characteristics: High-Performing High-Poverty Schools vs. All High-Poverty Schools

	Cohort 1			Cohort 3			Poverty >75% N=403 Mean (Standard Deviation)
Variable	High Level School A	High Level School B	High Slope, High Level School C	High Level School D	High Level School E*	High Slope, High Level School F	
Family/Child-Family/School							
Percent of Parents Who Saved Money for College	32.0	46.0	26.0	44.0	46.0	44.0	38.0 (41.0)
Percent of Parents Who Expect Child to Graduate College	69.0	44.0	64.0	50.0	44.0	54.0	52.0 (42.0)
Percent of Parents Who Expect Future Grades to Be Above Average	59.0	34.0	32.0	34.0	34.0	17.0	34.0 (40.0)
Percent of Parents Who Expect Child to Graduate High School	89.0	86.0	73.0	82.0	86.0	81.0	82.0 (33.0)
Parent Involvement: Frequency of Home Activities	1.65	1.78	1.58	1.93	1.78	1.88	1.67 (.27)
Average Number of School Contacts	1.34	1.26	1.37	1.31	1.26	1.18	1.38 (.17)
Parents' Opinions of School	1.72	1.91	1.55	1.80	1.91	1.81	1.81 (.30)
Parent Involvement: Frequency of School Activities	1.66	1.46	1.43	1.51	1.46	1.30	1.53 (.24)
Classroom Organization/Resources							
Class Size	20.8	22.6	22.1	17.5	22.6	25.7	23.9 (5.1)
Percent Chapter 1 Students /Class	19.8	15.1	61.2	19.0	15.1	15.9	33.9 (22.6)
Percent Chapter 1 Students Served In Class	18.0	16.2	51.5	11.6	16.2	0.00	23.9 (24.4)
Percent Chapter 1 Students Served Out of Class	2.45	0.25	6.04	11.1	0.25	10.4	14.2 (15.0)

*=data missing

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Exhibit C.2: Continued

	Cohort 1			Cohort 3			
Variable	A	B	C	D	E	F	Poverty >75% N=403 Mean (Standard Deviation)
Aide in Class	0.34	0.26	0.10	0.03	0.26	0.18	0.30 (.36)
Percent Whole Group Instruction	58.0	50.5	55.4	46.5	50.5	46.6	54.4 (13.8)
Average Hours Assigned Homework per Week	0.85	1.57	2.29	2.05	1.57	1.71	1.81 (.64)
Average Instruction Time (Minutes/Week)	259.4	375.3	295.9	381.4	375.3	255.6	278.7 (91.1)
Adequacy of Class Materials	0.89	0.71	0.62	0.87	0.71	0.58	0.77 (.31)
Use of Computers	1.0	0.02	0.85	1.0	0.02	0.99	0.80 (.27)
Teacher							
Years Teaching Experience	11.3	9.20	16.4	13.1	9.20	23.3	13.9 (6.1)
Teacher Education	2.65	3.56	3.85	3.64	3.56	3.12	3.25 (.66)
Hours In-Service Training/Year	3.37	1.78	2.36	2.52	1.78	1.54	2.82 (.61)
Percent Teachers Certified	1.0	1.0	0.99	1.0	1.0	1.0	0.92 (.21)
School Climate: Relations w/Staff	4.71	4.96	4.51	5.38	4.96	4.68	4.69 (.69)
School Climate: Relations w/Administration	4.61	4.97	4.52	5.01	4.97	4.65	4.49 (.81)
Community Climate	4.52	4.93	4.44	4.97	4.93	4.23	4.45 (.66)
Teacher Influence	4.00	3.12	2.73	3.99	3.12	3.30	3.75 (.89)

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Exhibit C.2: Continued

	Cohort 1			Cohort 3			
Variable	**A**	**B**	**C**	**D**	**E**	**F**	**Poverty >75% N=403 Mean (Standard Deviation)**
Opportunity to Learn: Math Emphasis							
Remedial Skills	2.30	2.60	2.78	2.55	2.60	2.40	2.54 (.29)
Higher-Order Thinking	1.90	2.50	2.61	2.52	2.50	2.10	2.50 (.27)
Advanced Math	0.63	1.44	1.42	1.49	1.44	0.98	1.19 (.37)
Math Attitudes	x	2.69	2.61	2.43	2.69	2.03	2.46 (.25)
Oportunity to Learn: Reading Emphasis							
Remedial Skills	2.48	2.16	2.40	2.36	2.16	2.48	2.36 (.27)
Comprehension	2.49	2.46	2.77	2.82	2.46	2.62	2.58 (.26)
Application	1.03	1.52	2.03	1.79	1.52	1.53	1.64 (.44)
Reading Attitudes	2.85	2.59	2.96	2.98	2.59	2.80	2.86 (.21)
Writing Attitudes	2.46	1.17	2.37	1.78	1.17	2.09	2.21 (.46)
Reading-Writing Integration	2.32	1.60	2.11	2.58	1.60	1.30	2.21 (.42)

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